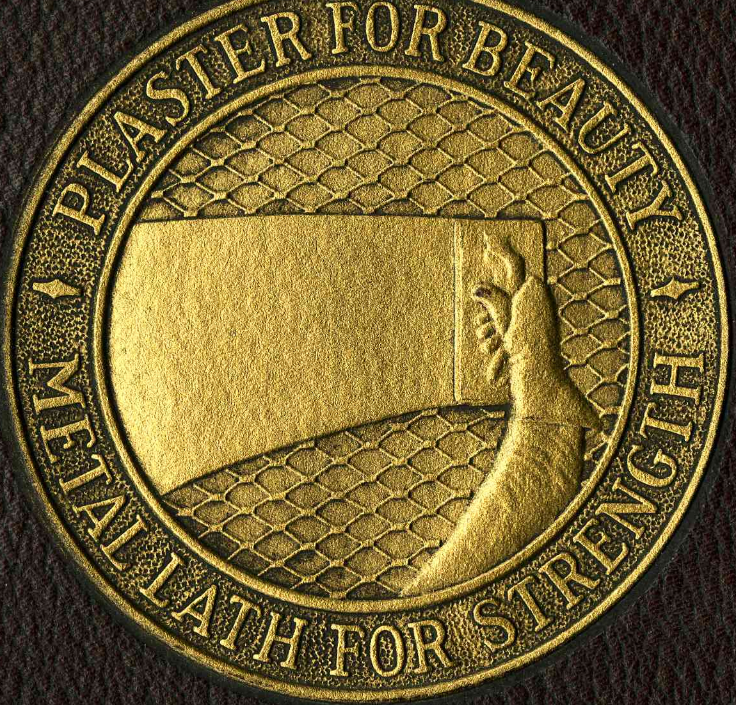

METAL LATH HANDBOOK

THE PEDLAR PEOPLE LIMITED
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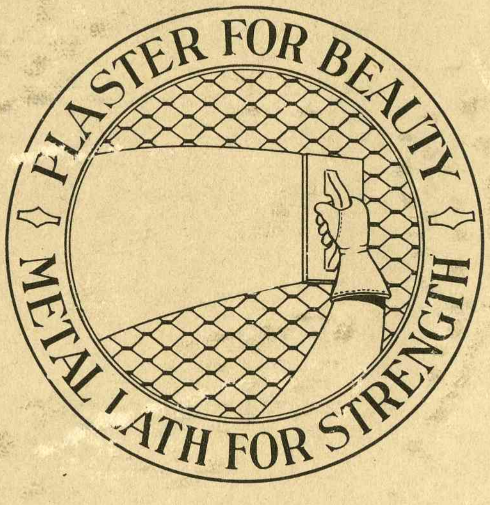
Metal Lath Handbook



Published by
Associated Metal Lath Manufacturers of Canada
21 King Street East - Toronto, Ontario

Members:
Eastern Steel Products, Ltd.
Preston, Ont. and Montreal, Que.

The Pedlar People, Ltd.
Oshawa, Ont. and Montreal, Que.

Truscon Steel Co., (of Canada) Ltd.
Windsor, Ont. and Montreal, Que.

R.A.I.C. FILE No. 20

PREFACE

Metal lath was first patented nearly a century ago. It was originally sheets of metal having holes or slits punched into it but did not prove entirely efficient as no provision was made for keying or clinching the plaster. Its high cost of production and slow manufacturing process also prohibited its general use at that early date.

The invention of expanding metal sheets in 1885 was the first forward step in making metal lath a commercial possibility. This type of lath was a marked improvement over the first methods but owing to the shape of its mesh it required an excessive amount of plaster and its manufacturing process proved to be too slow for modern requirements. This mesh was deployed rather than expanded in the sense in which we use the term today to denote the operation of cold-drawing the strands to form the mesh. This cold-drawing process greatly strengthens the metal and the neat small mesh affords the best possible key for the plaster in which it is completely imbedded. In addition it comes in flat sheets of convenient size for handling and is quickly applied.

By careful comparison it has been found that modern manufacturing facilities permit expanded metal lath, unlike its predecessors, to be economically used for all types of construction.

It has been our aim, in the compiling of this Handbook, to provide the architect with all possible information pertaining to metal lath construction so that he may be enabled to design his structure to take advantage, not only of the special merits of metal lath, but the load saving, space saving and cost saving made available by its use.

This handbook is devoted to a discussion of various types of partitions and ceilings from the standpoint of space saving, fire protection, resistance to impact and transmission of sound and other important properties in both fireproof and non-fireproof buildings from the small home to the tallest skyscraper.

Included also are complete working diagrams and specifications covering each step in the construction of metal lath ceilings and partitions in all classes of buildings and the installation of all types of trim, electrical and plumbing fixtures and special details.

The construction methods described herein are time-tested established practices. They have been obtained by special field investigation of actual construction procedure and through cooperation of architects and engineers, manufacturers and producers of building materials and accessories, plastering and lathing contractors and mechanics and many individual authorities.

The cooperation of the factors of such widely diversified interests has aided materially in developing information which is considered reliable and which is hoped will prove of practical value to the architect and construction industry.

Due appreciation of the assistance rendered by the Metal Lath Manufacturers Association of United States by the use of information and data obtained by them together with their permission to employ certain of their illustrations is hereby acknowledged.

ASSOCIATED METAL LATH MANUFACTURERS
OF CANADA.

Superiorities of Metal Lath

The seven cardinal factors of superiority of Metal Lath over other types of plaster base are, in the order named—Space Saving; Cost; Fire Retardance; Sound Insulation; Weight; Adaptability and Shock Resistance.

In the following pages of this volume the factors are taken up individually with a separate chapter devoted to each item but it might be well to make a brief mention here of each superiority.

SPACE SAVING:

An analysis of conditions governing the selection of partition materials shows that architects, builders and investors consider Space Saving the factor of greatest importance. By use of the two inch solid plaster partition reinforced with metal lath, the minimum amount of floor area is consumed and the huge waste of space used by heavy, thick partitions is eliminated.

COST:

The cost of a structure is shown to be the second factor in importance for a large majority of all types of buildings and occupancy.

Cost is not alone dependent on the selection of materials in a partition as space saving materially effects cost and therefore the two factors should be considered as complimentary factors. Repairs and upkeep are likewise an item of cost and in the selection of the plaster base this subject should be considered.

All these factors of cost are fully discussed in the following Chapter on Costs.

FIRE RESISTANCE:

Although fire retardance is one of the important factors in building construction, the survey of architects and builders referred to above indicated it takes third position in the consideration of materials.

Innumerable tests and actual fires in some of the largest cities on this continent have proven the superiority of metal lath and plaster as a fire retardant.

Recent tests conducted by Prof. W. L. Sagar of the University of Toronto prove beyond any doubt the fire retardance qualities of metal lath and plaster and a copy of Prof. Sagar's report will gladly be mailed upon receipt of request for it.

SOUND INSULATION:

Sound insulation is fourth in order of importance and in the Chapter on this subject both technical and non-technical information is given.

WEIGHT:

The weight of material entering into a construction is a serious factor and should be given careful consideration as substantial reductions in the dead load carried by the structure effect amazing savings in the cost of the steel or reinforced concrete frame.

Due to the lightness of metal lath, especially when two inch partitions are employed, considerable structural savings can be effected and this is fully discussed in the Chapter on Load Saving.

ADAPTABILITY:

No other plaster base adapts itself to meet all conditions as does metal lath. In the Chapter on Adaptability is shown a comprehensive survey of where metal lath may be used to advantage in the several types of structures.

SHOCK RESISTANCE:

This factor is considered the last but by no means the least item of importance in the selection of plaster base material. Due to the monolithic construction of a metal lath and plaster partition or ceiling it is exceptionally resistant to cracks and impact. The Chapter of this factor fully describes the merits of metal lath for this important item.

Section No. 1

Standard Specifications for Metal Lath Construction

PLASTER FOR BEAUTY
METAL LATH FOR STRENGTH

Published by

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Section No. 1. Metal Lath Specifications

These specifications cover the quality of materials and methods of application of all types of Metal Lath expanded or fabricated from sheets and primarily designed to be used as a base for plaster.

Special attention is called to the fact that these specifications are written upon the basis of weight only, which will insure equality of competition and facilities for accurate inspection in the field.

These specifications are the combined results of many years of investigation into the specifications of leading architects, inspection of actual construction in all parts of the country, research into scores of building codes, and circulating questionnaires among contractors.

These specifications are written in detail but may be abbreviated as desired, or this document may be referred to as follows:

> **"All metal lathing or furring shall be done in accordance with the requirements for the corresponding class of work as specified in Standard Specifications of the Associated Metal Lath Manufacturers of Canada, provided that where several methods of construction are shown, the contractor shall secure approval of the type he wishes to use before proceeding with the work. The lath to be used shall be as follows: etc. (Here insert weight, type and finish desired for each position.)"**

Any specification taken from these pages will insure not only safe and permanent construction with economical cost, but will establish a basis for maximum competition among all manufacturers of Expanded Metal Lath.

NOMENCLATURE

Flat Expanded Lath (Diamond or Herringbone Mesh):

This term is used to indicate a metal lath, slit and expanded from sheet metal into such form that there will be no rib in the lath.

Flat Rib Lath:

An expanded metal lath in which the rib has a total depth of less than three-sixteenths of an inch.

Three-eighths inch Rib Lath:

Is a combination of expanded metal lath and ribs three-eighths of an inch deep.

Self Furring Lath (Diamond Mesh):

A diamond mesh lath with one inch by one-quarter inch corrugations running longitudinally. For use in stucco construction.

Paper Backed Metal Lath:

A factory assembled combination of any of the preceeding defined types of metal lath or expanded metal reinforcing with paper, fibre or other backing, the assembly being used as plaster or stucco base.

Attached Ceiling:

A ceiling which is clipped or wired in direct contact with the construction above without the use of runner channels and with or without the use of furring channels as the construction may require.

Suspended Ceiling:

A ceiling which is suspended from and is not in direct contact with floor or roof construction.

Hangers:

The vertical members of a suspended ceiling which carry the steel framework.

Runner or Carrying Channels:

The heaviest horizontal members of a suspended ceiling and from which the furring channels or rods are supported.

Furring Channels or Rods:

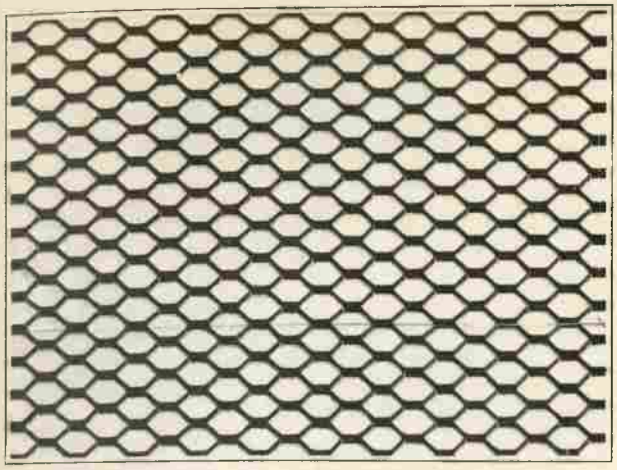
The smallest horizontal members of a suspended ceiling and to which the lath is attached; also the horizontal members in an attached ceiling; also, in general the separate members used to space metal lath from any surfaces over which it is applied.

Cornerite:

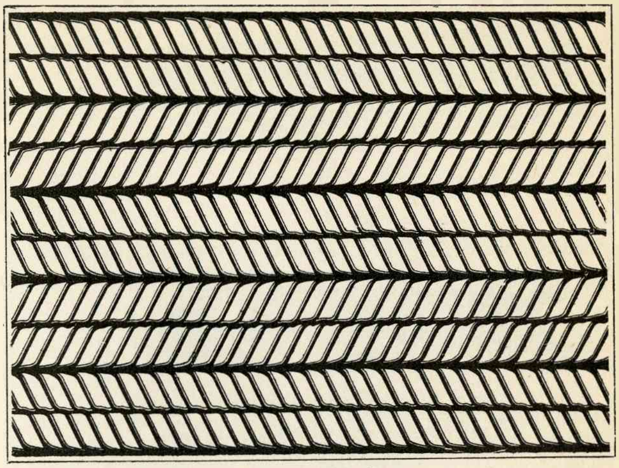
A strip of metal lath bent into the shape of an "L" and applied as corner reinforcement at internal angles over wood lath, plasterboard or fibre board or junctures at wall and ceiling intersections of dissimilar materials or in angles where ends of sheets of lath abut.

Stripite:

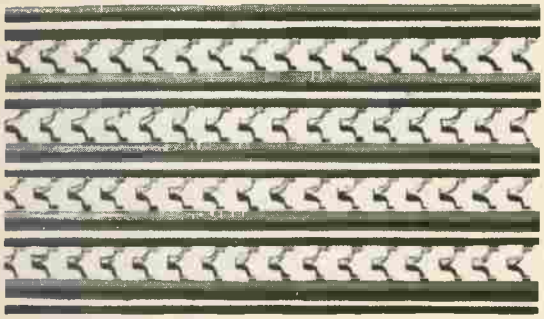
A narrow strip of flat expanded metal lath applied as a necessary reinforcement over joints between sheets of plasterboard, fibre board and similar materials used as plaster bases.



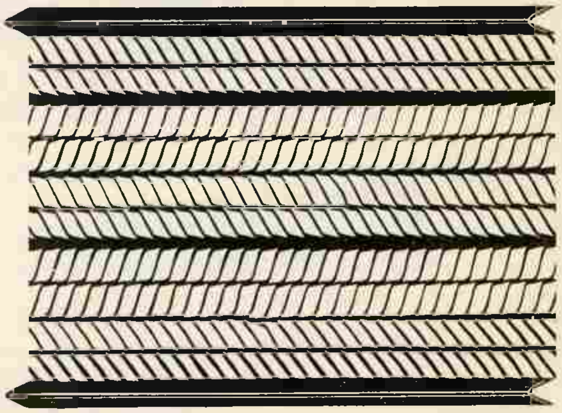
Diamond Mesh Lath
Fig. 1



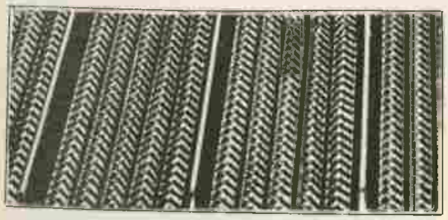
Herringbone Mesh Lath
Fig. 2



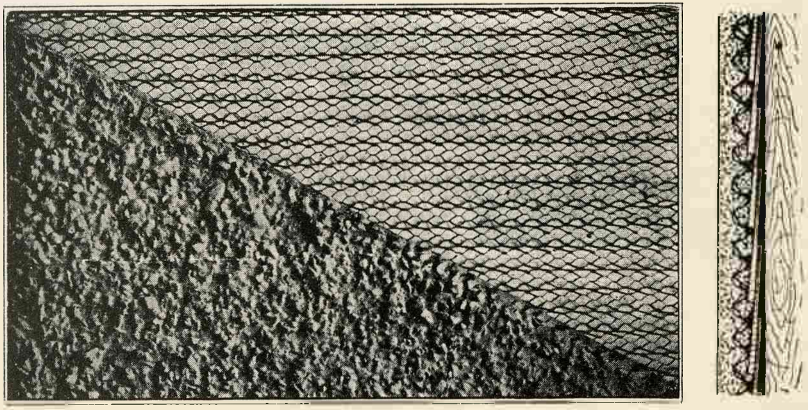
Flat Rib Lath
Fig. 3



Rib Lath
Fig. 5



Rib Lath
Fig. 4



Self Furring Lath
(Diamond Mesh)
Fig. 7

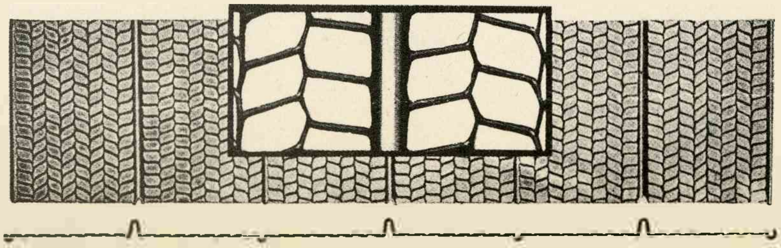
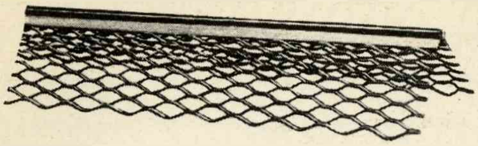
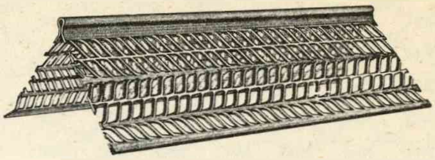


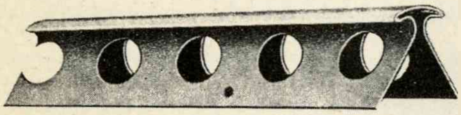
Fig. 6. ⅜ Inch Rib Lath



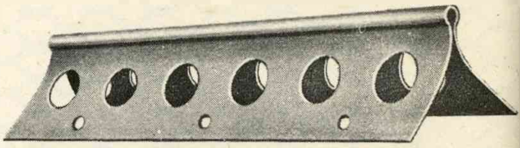
Expanded Corner Bead
Fig. 8



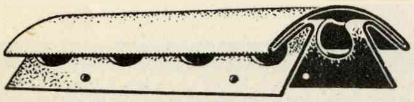
Doublemesh Corner Bead
Fig. 9



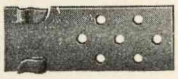
Bull Nose Corner Bead
¾″ Radius Standard Short Wing
Fig. 10



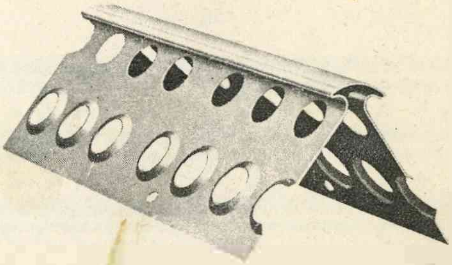
Standard Corner Bead
Fig. 11



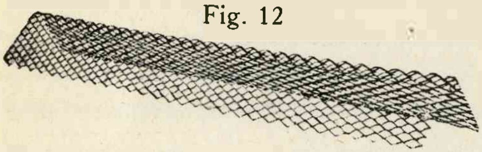
Bull Nose Corner Bead
1½″ Radius
Fig. 12



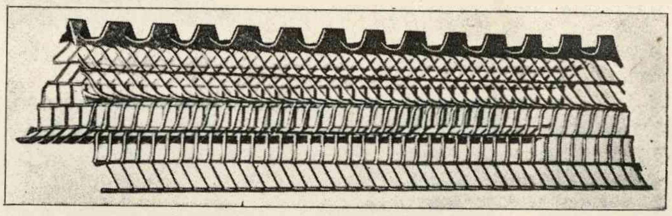
C. B. Clips
Fig. 14



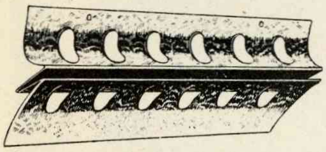
Bull Nose Corner Bead
¾″ Radius 2½″ Plain Wing
Fig. 13



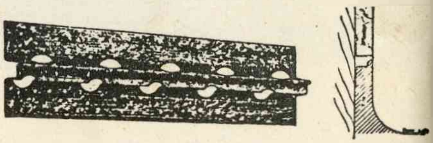
Cornerite
Fig. 15



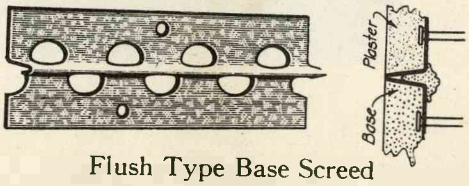
Doublemesh Cornerite
Fig. 16



Picture Mould
Fig. 17



Base Screed
Fig. 18



Flush Type Base Screed
Fig. 19

No. 1 Wood Stud and Joist Construction

Weights of Lath:

For Partitions: Flat expanded metal lath or flat rib lath weighing not less than 2.5 lbs. per square yard shall be used on studs spaced at 12 inches on centers. For studs spaced at 16 inch centers, 3 lb. flat expanded, or flat rib lath or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard should be used.

On vertical surfaces back of tile work where studs are spaced 12 inches to 16 inches on centers, expanded metal lath, flat rib lath or ⅜ inch rib lath shall weigh not less than 3 lbs. per square yard. Studs spaced over 16 inches on centers shall have ⅜ inch rib lath weighing not less than 3.5 lbs. per square yard.

For Ceilings. For wood joists spaced 12 inches on centers, expanded metal lath or flat rib lath weighing not less than 2.5 lbs. per square yard shall be used. For joists spaced 16 inches on centers expanded metal lath or flat rib lath weighing not less than 3 lbs. per square yard or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard shall be used.

Furring Strips:

Furring strips, if used, shall be not less than 1 inch by 2 inch strips spaced 12 inches on centers running at right angles to and securely nailed to each joist.

Attachments:

Metal lath shall be attached to studs and joists with not less than 1¼ inch large head nails spaced not over 6 inches apart.

Tie wire shall be not less than No. 18 gauge galvanized wire.

Corner Protection:

All exterior angles in plastering including angles at jambs and heads of windows and doors and other openings where reveals are plastered shall be protected with metal corner beads of approved design.

Internal corners wherever wood lath or plaster board is used shall be reinforced with Cornerite, 6 inch girth bent 3 inches by 3 inches.

Erection:

Metal lath shall be erected with long dimension across the supports; rib lath shall be applied with the ribs against the supports.

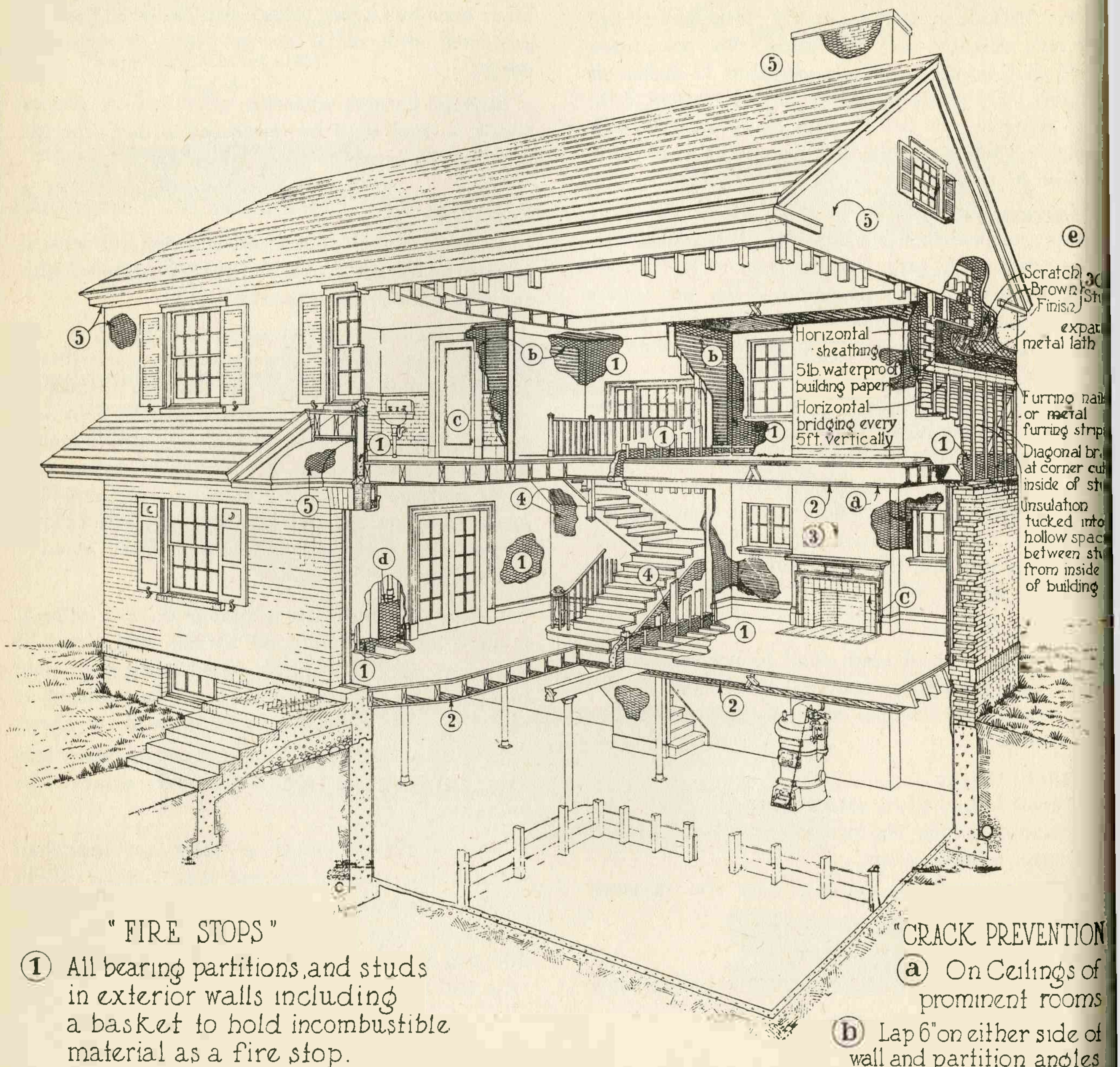
Lath shall be applied to the ceilings first and carried down 6 inches onto the walls and partitions. If metal lath is not used on the ceilings, the lathing may start at the top of the wall and be bent and carried over onto the ceiling joists at least 3 inches so that no joints occur at juncture of ceiling and walls; and on walls, all lath shall be started one stud away from corner and be bent into corner and carried onto the abutting wall so as to avoid a joint at juncture of walls.

Where ⅜ inch rib lath is used on walls or ceilings, it shall be butted into all corners and strips of Cornerite shall be securely wired along each edge in all corners. Cornerite shall not be fastened at the corner but only along each edge of the sheet.

Lath shall be placed so that the lower sheet laps over the upper and shall be securely attached to supports.

Lath shall be lapped at sides not less than ½ inch and at ends not less than 1 inch. There shall be one wire tie on side laps half-way between supports. End laps shall occur over supports. Rib lath shall be lapped at sides by nesting outside ribs, and at ends 1 inch.

"METAL LATH STOPS FIRE AND PREVENTS CRACKS"



"FIRE STOPS"

① All bearing partitions, and studs in exterior walls including a basket to hold incombustible material as a fire stop.

② Ceilings under inhabited floors, especially over heating plants and coal bins.

③ At chimney breasts, around flues and back of kitchen ranges.

④ Stair-wells and under stairs.

⑤ As a base and reinforcement for exterior stucco.

"CRACK PREVENTION"

ⓐ On Ceilings of prominent rooms

ⓑ Lap 6" on either side of wall and partition angles and around door bucks

ⓒ Back of wainscots and tile mantels.

ⓓ Across plumbing-pipes and heat-ducts

ⓔ Showing proper construction of exterior stud walls for successful stucco

PLATE 1—MOST ADVANTAGEOUS POSITIONS FOR METAL LATH TO STOP FIRE AND PREVENT CRACKS IN PLASTER AND STUCCO

No. 2 Suspended Ceilings

Suspended Below the Soffit of Steel or Concrete Beams or Purlins or Concrete or Hollow Tile Floor Arches

Hangers:

The minimum size for hangers shall be No. 9 gauge galvanized wire or ¾ inch by ⅛ inch band iron.

Hangers shall be spaced not to exceed 4 feet center to center in both directions.

Runner Channels:

Runner channels shall be not less than 1½ inch cold or hot rolled channels or angles of equivalent strength.

Spacing of runner channels shall not exceed 4 feet center to center.

Furring Channels:

Furring channels shall be not less than ¾ inch hot or cold rolled channels.

Spacing of furring channels shall be in accordance with weight of lath used and as specified hereinafter.

Weights of Metal Lath:

Where furring channels are spaced 12 inches on centers use expanded metal lath or flat rib lath weighing not less than 3 lbs. per square yard or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard. For furring channels spaced over 12 inches and up to 16 inches use ⅜ inch rib lath weighing not less than 3 lbs. per square yard.

Tie Wire:

Tie wire for securing furring channels to runner channels by saddle tying shall be not less than No. 18 gauge galvanized wire.

Tie wire for securing metal lath to furring channels shall be not less than No. 18 gauge galvanized wire.

Erection of Channel Frame:

Upper ends of hangers of wire or flats shall be of sufficient length to wrap twice around beams or provide a suitable anchorage in the concrete or tile. Where steel beams or purlins are not more than 4 feet center to center, hangers may be attached directly to them. When hangers are hung from concrete beams or arches, the hangers shall be placed before concrete is poured. When ceilings are hung from terra cotta floors, hangers shall be installed after the tile is in place. A hole shall be bored in the underside of the tile and the hanger inserted and securely anchored with either a cross piece of steel rod or toggle bolt.

Lower ends of wire hangers shall be of sufficient length to wrap twice around the runner channels and be given three twists around itself.

Lower ends of flat band iron hangers shall be bent at right angles to support the runner channel and all securely wired together with tie wire.

Runner channels shall conform to the contour of the ceiling and be securely attached to the hangers as hereinbefore specified.

Furring channels shall be erected at right angles to the runner channels and be securely wired to same by not less than three turns of tie wire at each crossing.

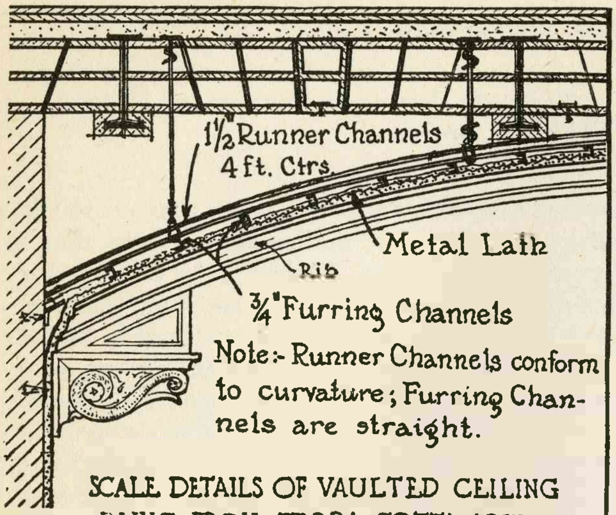
Erection of Metal Lath:

Metal lath shall be applied with the long dimension of the sheet across the furring channel.

Sheets shall be wired to the furring channels at intervals not exceeding 6 inches and a tie shall always occur where sides of sheets lap at channels. There shall be one tie on side laps half-way between channels.

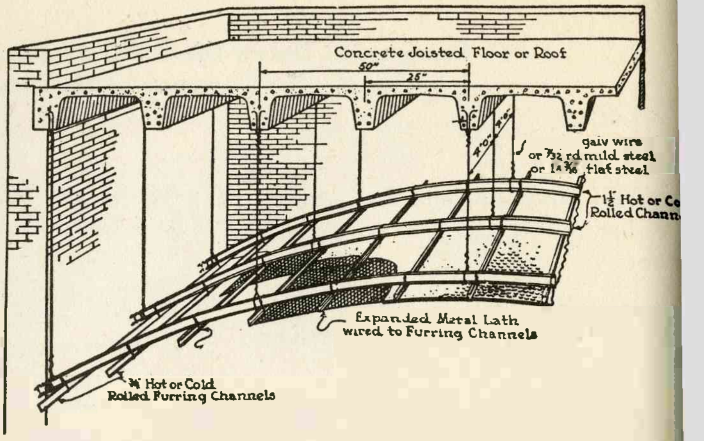
Lath shall be lapped at sides not less than ½ inch and at ends not less than 1 inch. End laps should occur only over furring channels, if between. the sheets shall be securely laced with No. 18 gauge galvanized wire.

Rib lath shall be lapped at sides by nesting outside ribs and at ends 1 inch.


1½" Runner Channels
4 ft. Ctrs.
Metal Lath
Rib
¾" Furring Channels
Note:- Runner Channels conform to curvature; Furring Channels are straight.

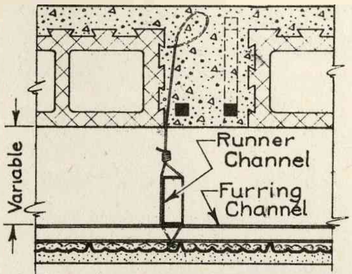
SCALE DETAILS OF VAULTED CEILING HUNG FROM TERRA COTTA ARCH

Fig. 20


Concrete Joisted Floor or Roof
50"
25"
4'-0"
4'-0"
galv wire or 7/32 rd mild steel or 1 x 3/16 flat steel
1½" Hot or Co
Rolled Chann
Expanded Metal Lath wired to Furring Channels
¾" Hot or Cold Rolled Furring Channels

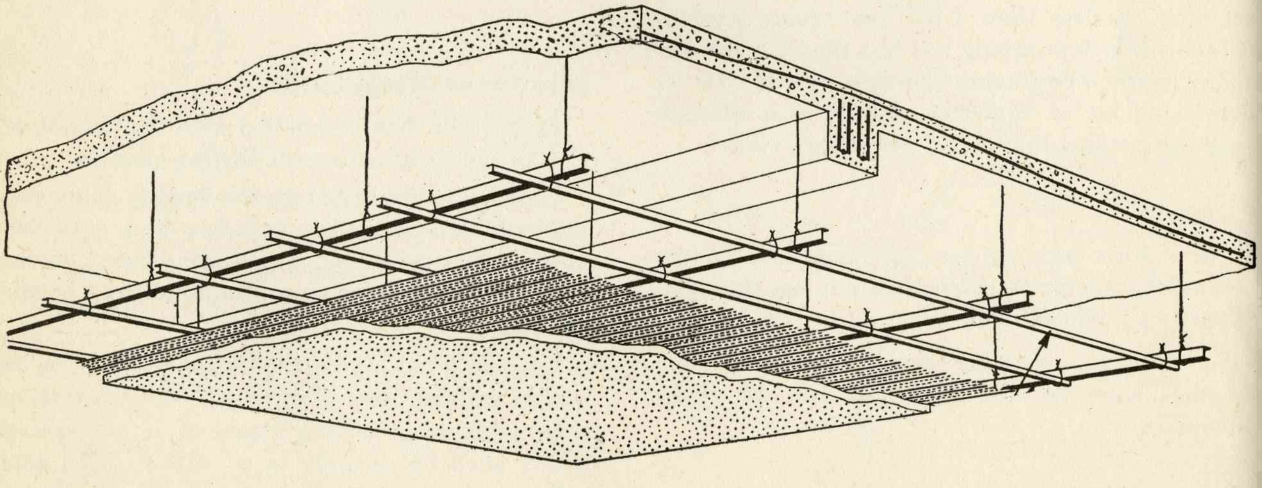
DETAILS OF SUSPENDED CEILING HUNG FROM CONCRETE JOISTED FLOOR OR ROOF.

Fig. 21



CEILING SUSPENDED FROM CONCRETE & TILE FLOOR SLAB

Fig. 22



Flat Suspended Ceiling
Fig. 23

No. 3 Attached Ceilings
(Contact or Furred)

For ceilings clipped to steel floor beams or in contact with concrete or terra cotta floors; for attached ceilings under concrete floors constructed with removable or permanent metal tiles and for ceilings under steel joist construction.

Furring Channels: (If used):

Not less than ¾ inch hot or cold rolled channels shall be used for furring channels.

Furring channels shall be supported at each beam or joist and in no case more than 4 feet centers. Spacing of furring channels shall be in accordance with weight of lath used.

Weights of Metal Lath:

Where furring channels are spaced 12 inch centers use expanded metal lath or flat rib lath weighing not less than 3 lbs. per square yard or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard. For furring channels spaced over 12 inches and up to 19 inches on centers use ⅜ inch rib lath weighing not less than 3 lbs. per square yard. For furring channels spaced over 19 inches and up to 24 inches use ⅜ inch rib lath weighing not less than 3.5 lbs. per square yard.

Tie Wire:

Tie wire for securing metal lath to furring channels shall be not less than No. 18 gauge galvanized wire.

Erection of Furring Channels:

Special clips are obtainable for clipping furring channels to steel beams. For concrete beams see Page 16, Fig. 25.

When removable pans are used, the soffit plank shall be drilled every 3 inches to take 3 inch wire nails which are inserted in each hole with the head up so that when concrete is poured the nail head will be held solidly in the face of concrete beam. Lath shall be attached to the face of beams and each nail turned over tightly to hold lath in place. Or ¼ inch rods or ¾ inch hot or cold rolled channels may be attached transversley to beams at 12 inch centers and flat expanded or flat rib lath attached to same with No. 18 gauge galvanized wire. See Page 16, Fig. 25.

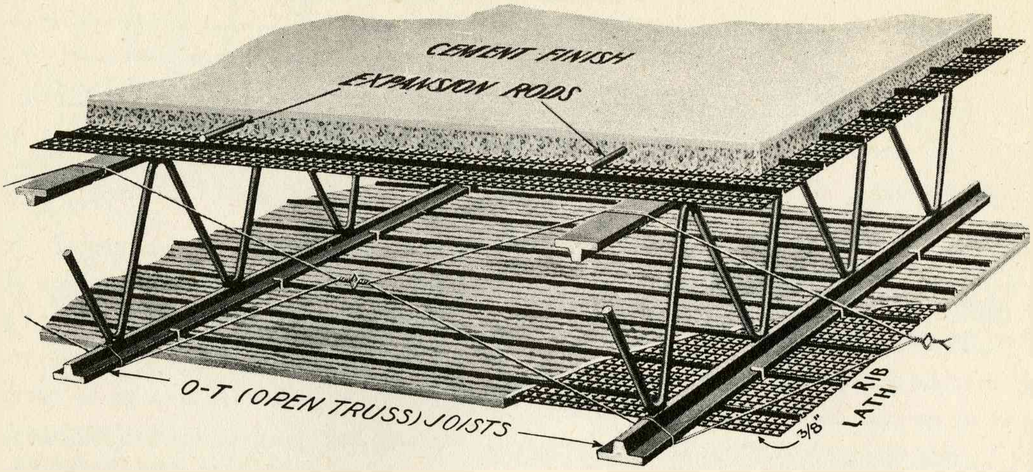
Metal lath ceilings to be attached to open steel joists may be done either by tying ¼ inch rods transversley to lower member of joists at centers suitable for lath to be used or by tying ⅜ inch rib lath of sufficient weight for spacing of joists directly to lower member of joists. See Page 16, Fig. 24 for illustration.

Erection of Metal Lath:

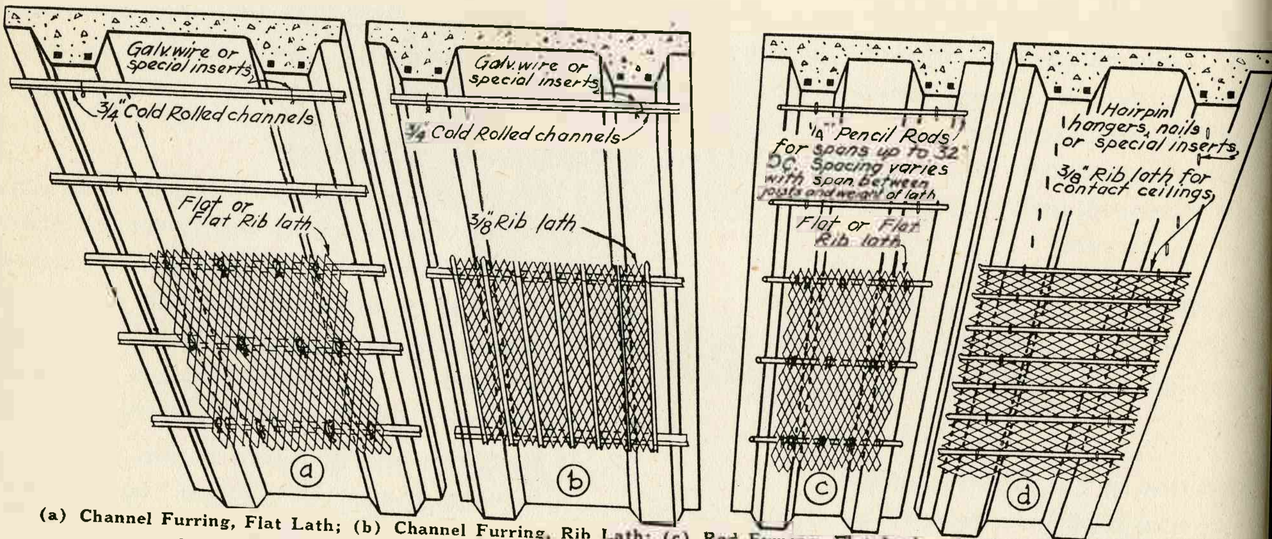
Metal lath shall be applied with the long dimension of the sheet across the furring channel. Sheets shall be wired to furring channels with not less than No. 18 gauge galvanized wire at intervals not exceeding 6 inches and a tie shall always occur where sides of sheets lap at channels. There shall be one tie on side laps half-way between channels.

Metal lath shall be lapped at sides not less than ½ inch and at ends not less than 1 inch. End laps of sheets should generally occur only over furring channels, if between, sheets shall be securely laced with No. 18 gauge galvanized wire.

Rib lath shall be lapped at sides by nesting outside ribs and at ends 1 inch. Ends shall lap as in preceeding paragraph.



Metal Lath attached to open steel joist
Fig. 24


Galv. wire or special inserts
3/4" Cold Rolled channels
Flat or Flat Rib lath
ⓐ
Galv. wire or special inserts
3/4 Cold Rolled channels
3/8" Rib lath
ⓑ
1/4" Pencil Rods for spans up to 32" OC. Spacing varies with span between joists and weight of lath.
Flat or Flat Rib lath
ⓒ
Hairpin hangers, nails or special inserts
3/8" Rib lath for contact ceilings
ⓓ

(a) Channel Furring, Flat Lath; **(b)** Channel Furring, Rib Lath; **(c)** Rod Furring, Flat Lath; **(d)** Contact Ceiling, Rib Lath.

DETAILS OF METAL LATH CEILINGS UNDER CONCRETE JOISTED FLOORS

Fig. 25

No. 4 Beams, Cornices, Columns and Pilasters

Weights of Metal Lath:

For beams and cornices where brackets are spaced 12 or 16 inches on centers expanded metal lath or flat rib lath shall be not less than 2.5 and 3 lbs. per square yard respectively.

For columns and pilasters where vertical members are spaced not to exceed 12 or 16 inches on centers, expanded metal lath or flat rib lath shall weigh not less than 2.5 lbs. and 3 lbs. per square yard respectively. Where vertical members are spaced over 16 inch and up to 20 inch centers, expanded metal lath or flat rib lath weighing not less than 3 lbs. per square yard or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard shall be used.

Brackets:

Brackets shall be formed of 1 inch by ⅛ inch or ¾ inch by ⅛ inch band iron and shall be spaced not more than 3 feet apart when used with longitudinal furring and not more than 12 inches apart if longitudinal furring is omitted. When longitudinal furring is not used at least one runner bar shall be installed to hold the work in place.

Vertical Framing Members:

Vertical framing members for columns and pilasters shall be ¾ inch hot or cold rolled channels and shall be braced every 3 feet of their height with similar channels or ¾ inch by ⅛ inch band iron.

Tie Wire:

Wire for tying braces to vertical members of columns and pilasters and for tying brackets to structural members shall be not less than No. 18 gauge galvanized wire.

Erection of Brackets:

Brackets shall be formed to templates in accordance with details and shall be securely wired, bolted or clamped to walls, ceilings or structural members.

Longitudinal channels shall be wired to brackets with not less than No. 18 gauge galvanized wire.

Erection of Framing:

Hoops or brackets for columns and pilasters conforming to details furnished shall be securely attached to steel members with clamps or wiring and to masonry walls by drilling holes and plugging.

Vertical framing shall be securely wired to brackets or hoops and shall be securely clamped or wired to structural members at floor and ceiling.

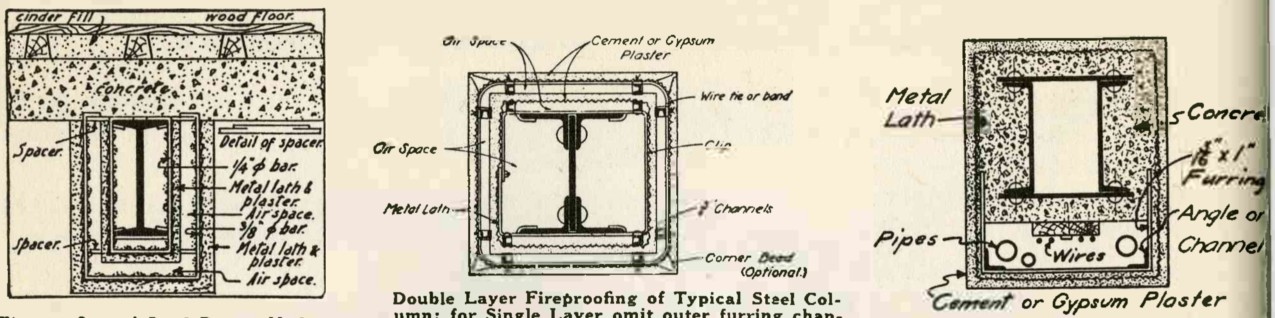
Erection of Metal Lath:

For beams and cornices metal lath shall be applied with the long dimension of the sheet running parallel to the longitudinal channels and be bent into and made to conform with the outline of the finished beam or cornice. Side laps shall not occur at the corners but strips of Cornerite shall be used at all corners. Side laps shall be ½ inch and end laps 1 inch. Side laps shall be wired once between channels and end laps securely laced with No. 18 gauge galvanized wire.

For columns and pilasters the metal lath shall be bent to conform to the outline, long dimension of the sheet at right angles to the vertical framing and securely wired with tie wire.

Metal lath shall be bent upon ceiling or a strip of Cornerite shall be used at the ceiling corners.

Sides of sheets shall lap 1 inch or in the case of rib lath by nesting outside ribs and be securely laced the full length of the lap with tie wire. Ends of sheets shall be lapped 1 inch and shall not occur at corners.



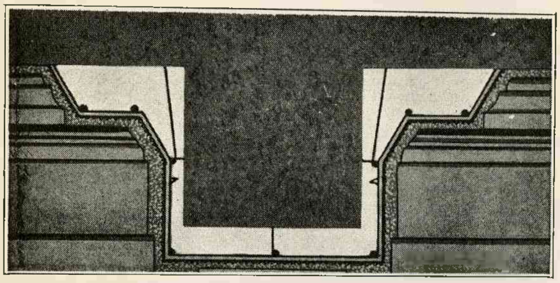
Fireproofing of Steel Beams Under Concrete Floors.

Double Layer Fireproofing of Typical Steel Column; for Single Layer omit outer furring channels, lath, and plaster. At Right—Another Suggestion for Fireproofing Columns.

Protection of Metal Column with Provis for Pipe Chase.

COMMON PRACTICE IN FIREPROOFING OF STEEL BEAMS, GIRDERS AND COLUMNS.

Fig. 26



Ornamental Beam and Cornice over unattractive concrete beam. ¼-inch Rod Hangers placed before pouring concrete. Holes are drilled for Brackets—¾-inch

Fig. 27

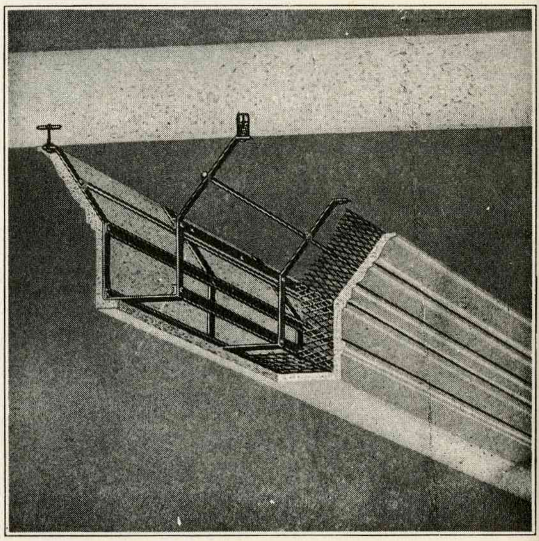
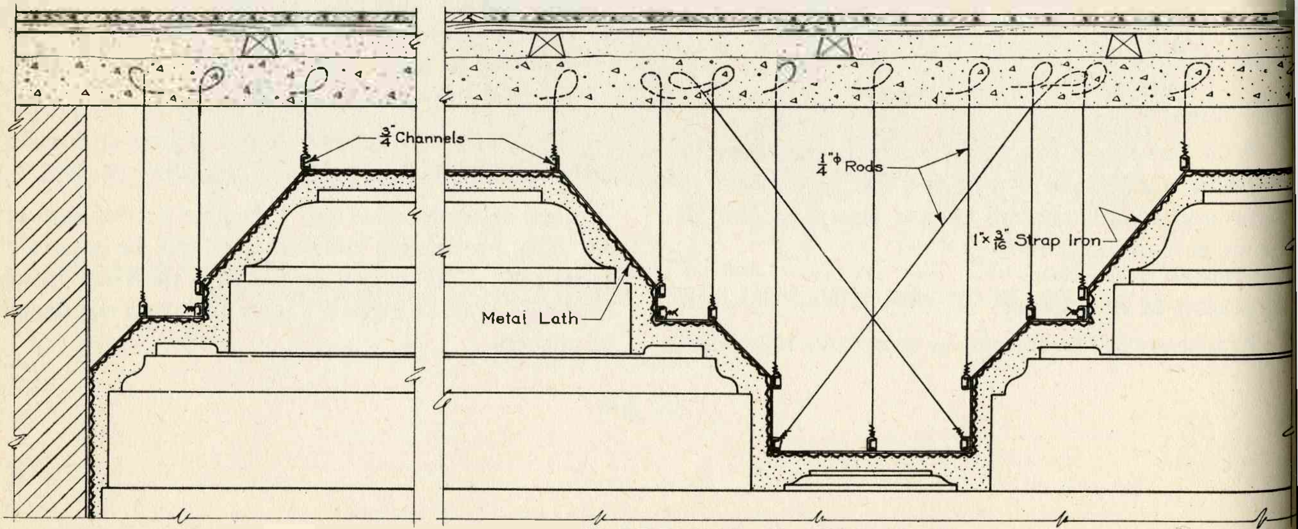


Fig. 28. False Beam



FALSE BEAM AND CORNICE SUSPENDED
FROM CONCRETE SLAB

Fig. 29

No. 5 Metal Stud Partitions
(Solid and Hollow)

Weights of Metal Lath:

Expanded metal lath, flat rib lath or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard shall be used on studs spaced up to and including 16 inches on centers. For studs spaced over 16 inches and up to 24 inches on centers, ⅜ inch rib lath weighing not less than 3 lbs. per square yard shall be used.

Studs:

For 2 or 2¼ inch solid metal lath and gypsum plaster partitions up to 14 feet in height, channel studs shall be not less than ¾ inch hot or cold rolled channels; over 14 feet and up to 20 feet in height not less than 1 inch hot or cold rolled channels shall be used. Over 16 feet in height such partitions shall have a minimum thickness of 2½ inches and be 2¾ inches thick for heights over 20 feet. Length between columns, walls or other vertical structural members shall not be greater than two times the partition height when the latter is 12 feet or more.

For hollow partitions double rows of ¾ inch channels with separators or a single row of channels or metal studs of the proper width shall be used. For such partitions the maximum height for a finished plaster thickness of 3, 4 and 5 inches shall be 18, 24 and 30 feet respectively, provided that permanent ¾ inch horizontal stiffener channels shall be provided on the inside of the partitions at intervals of 5 feet horizontally for all double row channel partitions more than 10 feet long and more than 9 feet high.

Studs for double metal lath soundproof partitions shall be a double row of parallel studs made up of channels each not less than ¾ inch hot or cold rolled channels. Maximum spacing along the face of the partition shall be in accordance with type and weight of lath used. No braces or cross-ties which will in any way permanently connect the channels on opposite sides of the partition, are permissible.

Runner Channels:

Floor and ceiling runner channels for both solid and hollow partitions, if used, shall be not less than 1 inch hot or cold rolled channels.

Spacers, Braces, Tie Wire:

Spacers for hollow partitions shall be of substantial design and shall be spaced approximately 3 feet on centers.

Braces for hollow partitions and soundproof partitions shall be as above specified.

Tie wire shall be not less than No. 18 gauge galvanized wire.

Before being plastered solid partitions shall be temporarily braced on the channel side at intervals not exceeding 5 feet vertically. Before plastering is begun each side of hollow soundproof partitions shall be likewise braced temporarily not exceeding 5 feet vertically.

Erection of Studding:

Where floor and ceiling runners are used, they shall be securely bolted or clamped to the floor beams, soffits of concrete or terra cotta arches and substantially secured to top of concrete or tile floors.

Where runner channels are not used, studs shall be erected by inserting ends in holes cut in top of concrete or other masonry floors or punched in soffits of masonry ceilings or by wire tying to nails driven into tops of wood floor bucks or into ceiling joists, or where metal lath ceilings are used upper ends of channels may be inserted into holes made in ceiling lath and channel studs wired to a channel secured to lath.

Where two-piece studs are used they shall be spliced within 2 feet of ceiling by lapping not less than 8 inches with the flanges interlocked and securely wired in two places not less than 6 nor more than 12 inches apart. Where single-piece studs are used, channel shall be of length to permit anchorage at top and bottom without material bowing when fully erected.

A channel or equal stud, continuous from floor to ceiling, shall in every case be placed adjacent to vertical door bucks and shall be so secured that space is provided between it and bucks for tying ends of metal lath sheets to such studs. Two wire nails shall be driven in pairs at intervals of 2 feet, beginning 9 inches above floor, into wood buck, and such channel stud shall be double wired to said nails in a secure manner. Where metal or metal and wood bucks are used, and excepting where such bucks dispense with need of channel directly against bucks equivalent means of attaching nearest channel shall be employed.

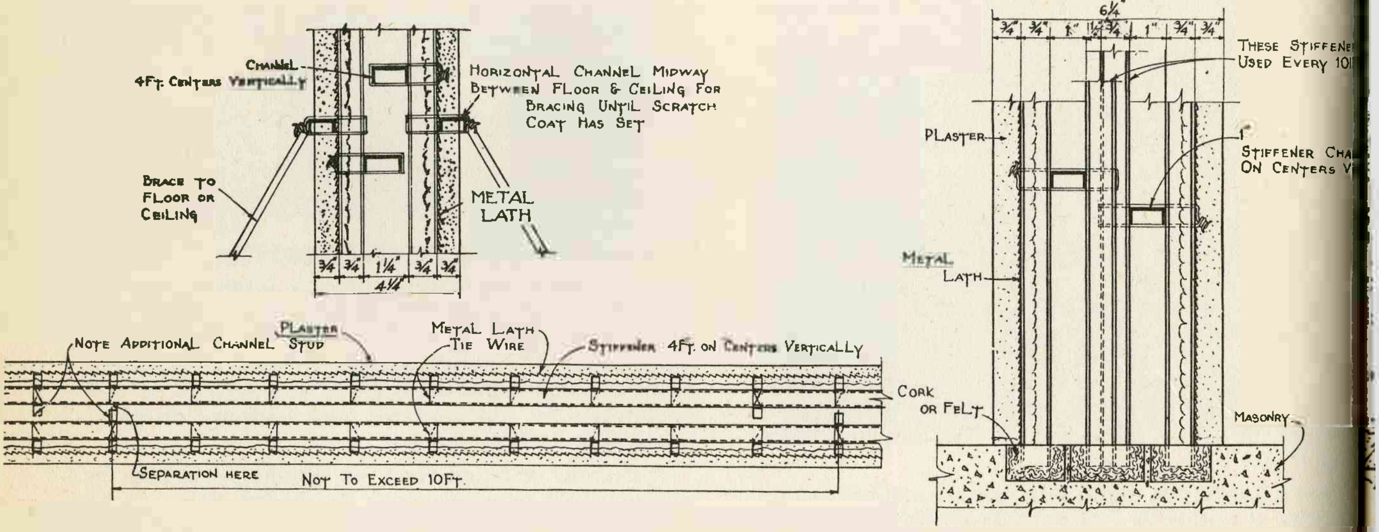
For soundproof partitions the studding shall be erected as above except that no part of channel studding shall be wired to or otherwise attached to or permitted to make contact with piping, conduit, heat ducts, etc., within the partition, provided further that for maximum sound-proofing, studs should rest on cork or felt insulation placed in holes cut in floor, or under runner channels or wood floor bucks into which stud ends set, so studs are insulated from bucks.

Erection of Metal Lath:

Metal lath shall be applied to one side only of the channels, with the long dimension of the sheet across the studs; ends of sheets shall be staggered one above the other. Lathing shall commence at top of partition and be carried down with the edge of the lower sheet lapping over the upper one. If metal lath is not used on ceiling, the lathing will start at top of wall and be bent and carried 6 inches on to the ceiling so that no joints occur at juncture of ceiling and walls; and on walls all lath shall be started one stud away from corner and be bent into the angle and carried onto the abutting wall to avoid a joint at juncture of walls; provided however, that where ⅜ inch rib lath is used it shall be butted into all joints and strips of Corneri shall be securely wired along each edge in a corners.

Sheets shall be wired to studs at intervals n exceeding 6 inches and a tie shall occur whe sides of sheets lap at channels. There shall be o tie on side laps half way between channels.

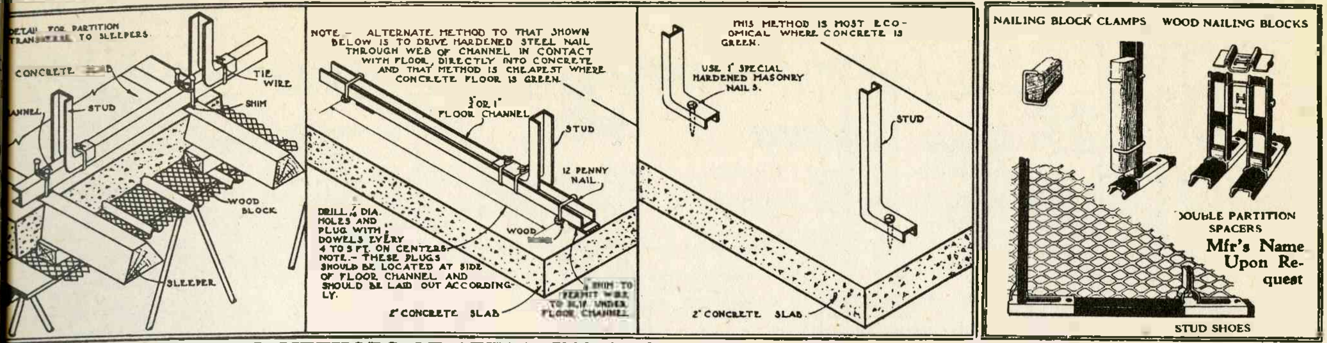
Metal lath shall be lapped at sides not less th ½ inch and at ends not less than 1 inch. End la of sheets should generally occur only over stud if between studs, sheets shall be securely lac with No. 18 gauge galvanized wire. Rib lath sh be lapped at sides by nesting outside ribs and ends 1 inch.


Channel
4Ft. Centers Vertically
Horizontal Channel Midway Between Floor & Ceiling For Bracing Until Scratch Coat Has Set
Brace To Floor or Ceiling
Metal Lath
3/4 3/4 1 1/4 3/4 3/4
4 1/4
Note Additional Channel Stud
Plaster
Metal Lath Tie Wire
Stiffener 4Ft. on Centers Vertically
Separation Here
Not To Exceed 10Ft.
6 1/4
3/4 3/4 1 1 1/2 3/4 1 3/4 3/4
These Stiffene Used Every 10
Plaster
Stiffener Cha On Centers V
Metal Lath
Cork or Felt
Masonry

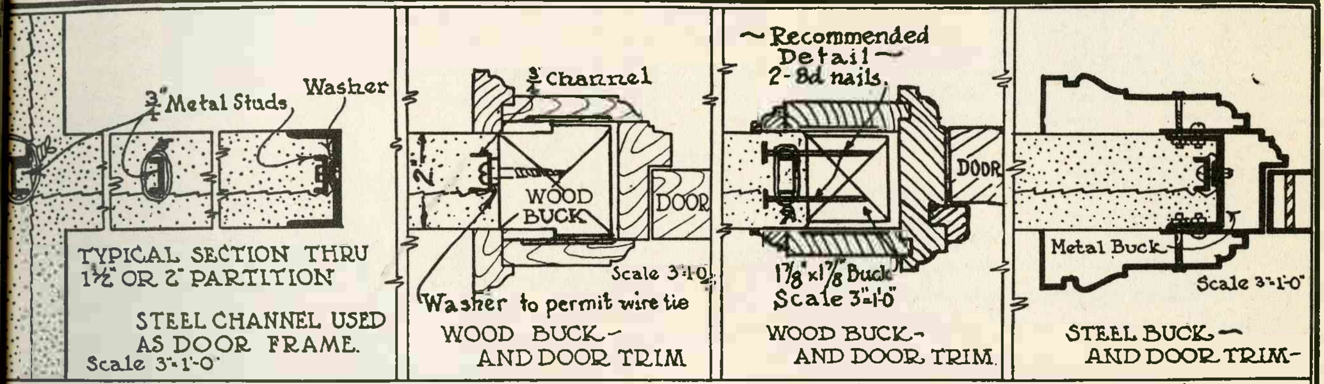
Soundproof Double Metal Lath Partition Details

Fig. 30

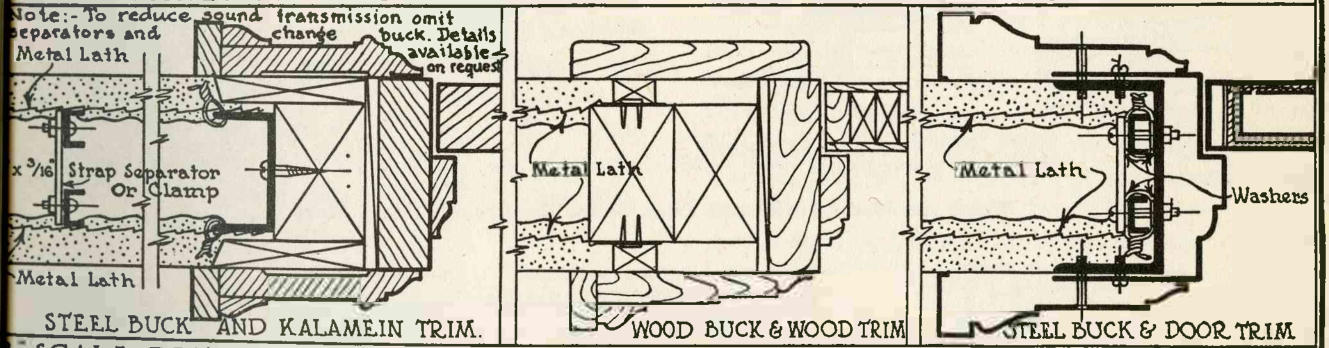
SPECIFICATIONS FOR METAL LATH CONSTRUCTION


DETAIL FOR PARTITION TRANS TO SLEEPERS.
CONCRETE
TIE WIRE
SHIM
STUD
WOOD BLOCK
SLEEPER
NOTE – ALTERNATE METHOD TO THAT SHOWN BELOW IS TO DRIVE HARDENED STEEL NAIL THROUGH WEB OF CHANNEL IN CONTACT WITH FLOOR, DIRECTLY INTO CONCRETE AND THAT METHOD IS CHEAPEST WHERE CONCRETE FLOOR IS GREEN.
¾" OR 1" FLOOR CHANNEL
STUD
12 PENNY NAIL.
DRILL ⅝ DIA. HOLES AND PLUG WITH DOWELS EVERY 4 TO 5 FT. ON CENTERS. NOTE.– THESE PLUGS SHOULD BE LOCATED AT SIDE OF FLOOR CHANNEL AND SHOULD BE LAID OUT ACCORDINGLY.
WOOD
SHIM TO PERMIT WIRE TO SLIP UNDER FLOOR CHANNEL
2" CONCRETE SLAB
THIS METHOD IS MOST ECONOMICAL WHERE CONCRETE IS GREEN.
USE 1" SPECIAL HARDENED MASONRY NAILS.
STUD
2" CONCRETE SLAB.
NAILING BLOCK CLAMPS
WOOD NAILING BLOCKS
OUBLE PARTITION SPACERS
Mfr's Name Upon Request
STUD SHOES

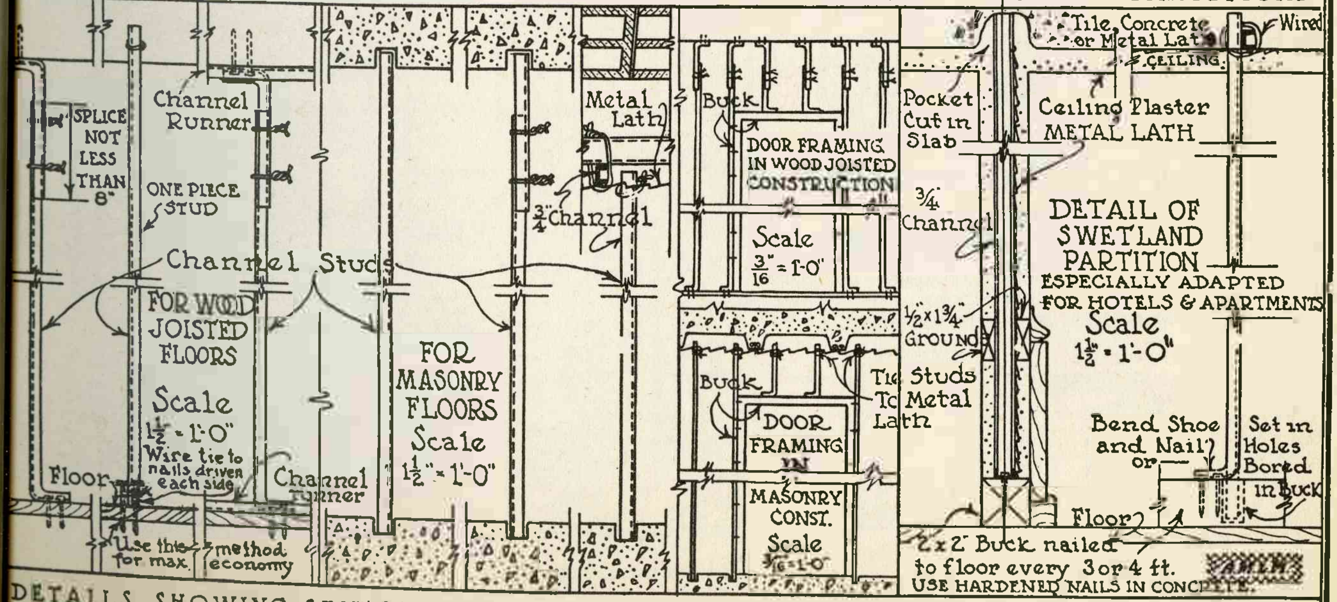
TYPICAL METHODS OF ATTACHING STUDS TO FLOORS (See Also Details Below)


¾" Metal Studs
Washer
TYPICAL SECTION THRU 1½" OR 2" PARTITION
STEEL CHANNEL USED AS DOOR FRAME.
Scale 3"-1'-0"
¾" Channel
2"
WOOD BUCK
DOOR
Scale 3"-1'-0"
Washer to permit wire tie
WOOD BUCK – AND DOOR TRIM
~ Recommended Detail ~
2-8d nails.
DOOR
1⅞"x1⅞" Buck
Scale 3"-1'-0"
WOOD BUCK – AND DOOR TRIM.
Metal Buck
Scale 3"-1'-0"
STEEL BUCK – AND DOOR TRIM –

DETAILS SHOWING METAL LATH AND STUDS IN 2" SOLID PARTITIONS.


Note:- To reduce sound transmission omit separators and Metal Lath
change
buck. Details available on request
x 3/16 Strap Separator Or Clamp
Metal Lath
STEEL BUCK AND KALAMEIN TRIM.
Metal Lath
WOOD BUCK & WOOD TRIM
Metal Lath
Washers
STEEL BUCK & DOOR TRIM

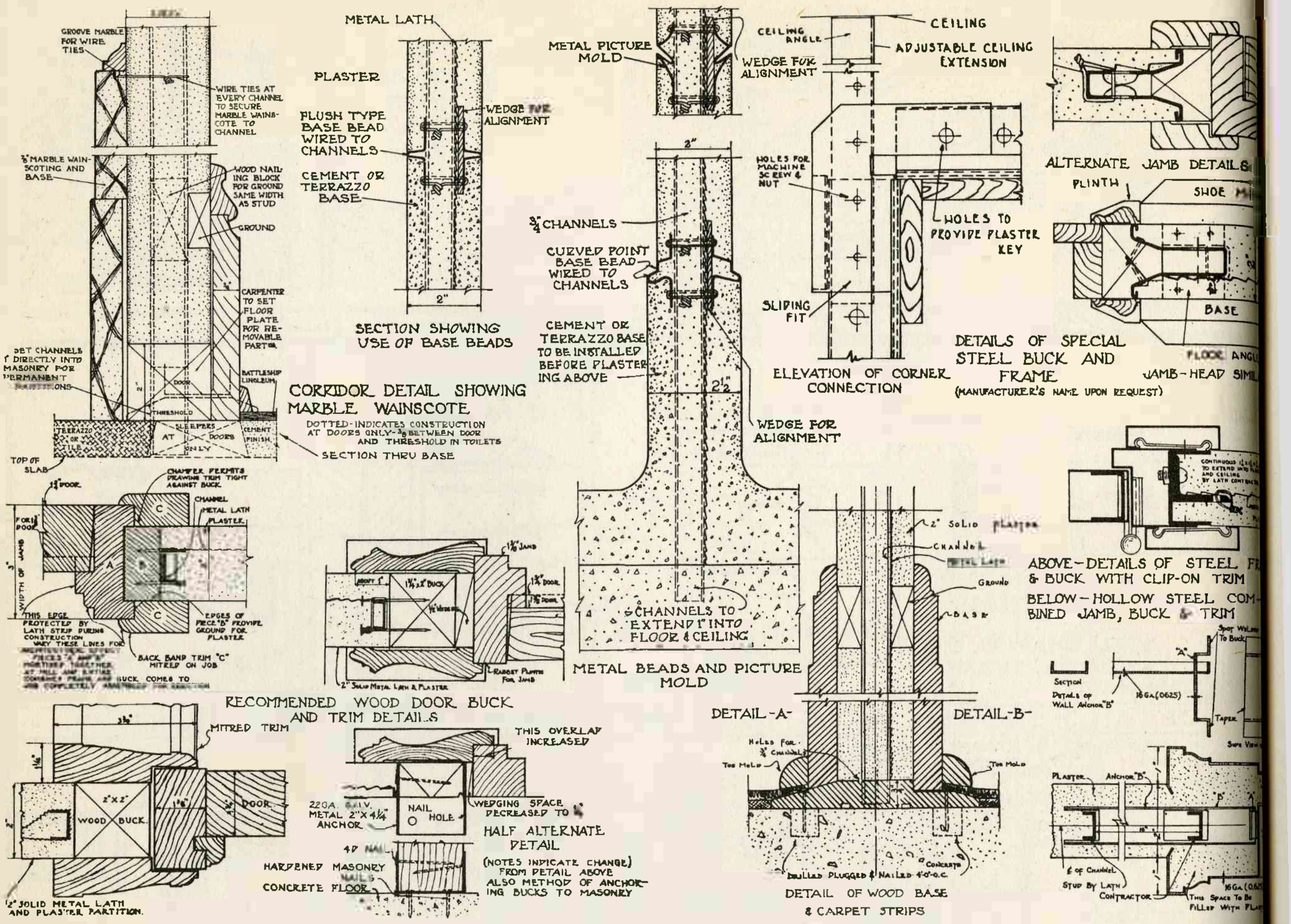
3" SCALE DETAILS SHOWING METAL LATH AND STUDS IN 4" HOLLOW PARTITIONS



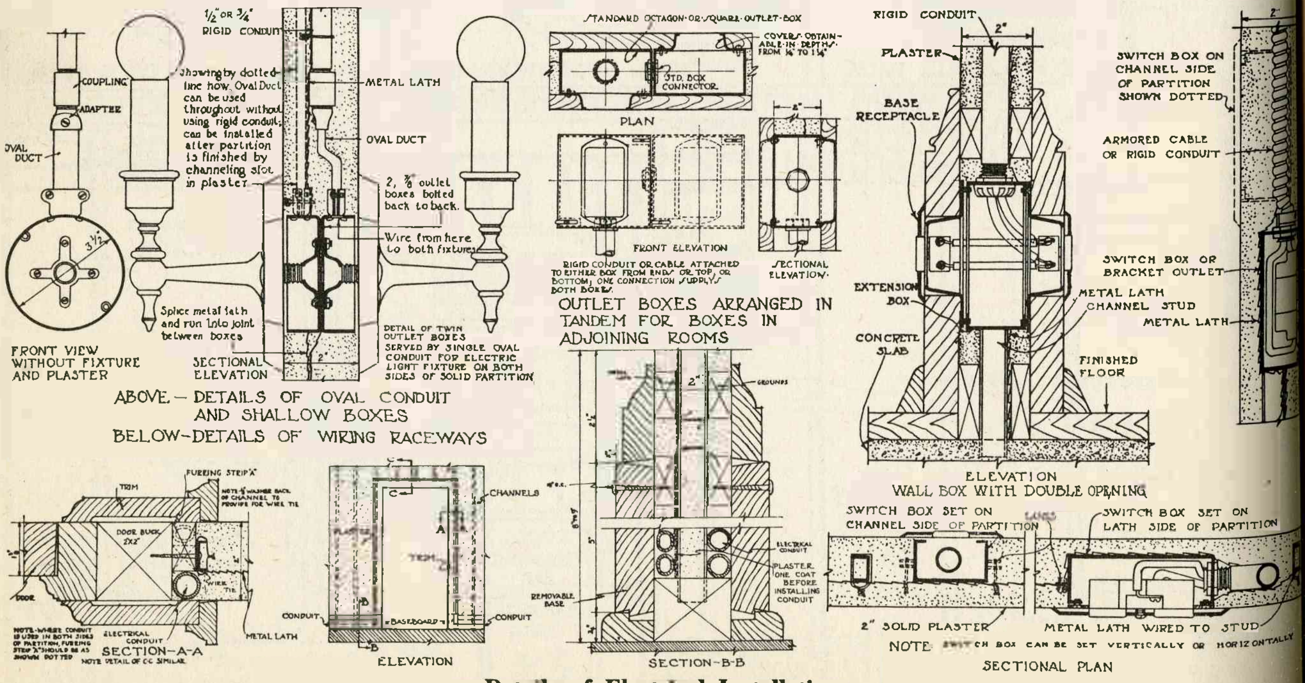
DETAILS SHOWING SEVERAL METHODS OF ANCHORAGE OF STUDS AT CEILING AND FLOOR

DETAILS SHOWING USE OF METAL LATH FOR SINGLE & DOUBLE PARTITIONS

ig. 31


GROOVE MARBLE FOR WIRE TIES
WIRE TIES AT EVERY CHANNEL TO SECURE MARBLE WAINSCOTE TO CHANNEL
⅞" MARBLE WAINSCOTING AND BASE
WOOD NAILING BLOCK FOR GROUND SAME WIDTH AS STUD
GROUND
CARPENTER TO SET FLOOR PLATE FOR REMOVABLE PARTS
BATTLESHIP LINOLEUM
SET CHANNELS DIRECTLY INTO MASONRY FOR PERMANENT PARTITIONS
THRESHOLD
DOOR
TERRAZZO OR TILE
SLEEPERS AT DOORS ONLY
CEMENT FINISH
TOP OF SLAB
CORRIDOR DETAIL SHOWING MARBLE WAINSCOTE
DOTTED-INDICATES CONSTRUCTION AT DOORS ONLY-⅜ BETWEEN DOOR AND THRESHOLD IN TOILETS
SECTION THRU BASE
METAL LATH
PLASTER
FLUSH TYPE BASE BEAD WIRED TO CHANNELS
WEDGE FOR ALIGNMENT
CEMENT OR TERRAZZO BASE
2"
SECTION SHOWING USE OF BASE BEADS
METAL PICTURE MOLD
¾" CHANNELS
CURVED POINT BASE BEAD WIRED TO CHANNELS
CEMENT OR TERRAZZO BASE TO BE INSTALLED BEFORE PLASTERING ABOVE
2½"
WEDGE FOR ALIGNMENT
CHANNELS TO EXTEND 1" INTO FLOOR & CEILING
METAL BEADS AND PICTURE MOLD
CEILING
CEILING ANGLE
WEDGE FOR ALIGNMENT
ADJUSTABLE CEILING EXTENSION
HOLES FOR MACHINE SCREW & NUT
HOLES TO PROVIDE PLASTER KEY
SLIDING FIT
ELEVATION OF CORNER CONNECTION
DETAILS OF SPECIAL STEEL BUCK AND FRAME
(MANUFACTURER'S NAME UPON REQUEST)
ALTERNATE JAMB DETAILS
PLINTH
SHOE
BASE
FLOOR ANGLE
JAMB-HEAD SIMILAR
ABOVE-DETAILS OF STEEL F
& BUCK WITH CLIP-ON TRIM
BELOW-HOLLOW STEEL COM-
BINED JAMB, BUCK & TRIM
Section
Details of Wall Anchor "B"
16 GA.(.0625)
Taper
PLASTER
ANCHOR "B"
℄ of Channel
Stud By Lath Contractor
This Space To Be Filled With Plaster
CHAMFER PERMITS DRAWING TRIM TIGHT AGAINST BUCK
CHANNEL
METAL LATH
PLASTER
WIDTH OF JAMB
THIS EDGE PROTECTED BY LATH STRIP DURING CONSTRUCTION
EDGES OF PIECE "B" PROVIDE GROUND FOR PLASTER
BACK BAND TRIM "C" MITRED ON JOB
1⅜" JAMB
1⅜" DOOR
1⅜"x2" BUCK
2" Solid Metal Lath & Plaster
Rabbet Plinth For Jamb
RECOMMENDED WOOD DOOR BUCK AND TRIM DETAILS
MITRED TRIM
2"x2" WOOD BUCK
DOOR
2" SOLID METAL LATH AND PLASTER PARTITION
THIS OVERLAP INCREASED
22 GA. GALV. METAL 2"x4¼" ANCHOR
NAIL HOLE
WEDGING SPACE DECREASED TO ¼
HALF ALTERNATE DETAIL
(NOTES INDICATE CHANGE) FROM DETAIL ABOVE ALSO METHOD OF ANCHORING BUCKS TO MASONRY
4D NAIL
HARDENED MASONRY NAILS
CONCRETE FLOOR
2" Solid Plaster
Channel
Metal Lath
Ground
Base
DETAIL-A-
DETAIL-B-
Holes for ¾" Channel
Toe Mold
Drilled Plugged & Nailed 4'-0" o.c.
Concrete
DETAIL OF WOOD BASE & CARPET STRIPS

Wood and Metal Bucks and Trim, Metal Beads and Picture Mold.


½" or ¾" RIGID CONDUIT
COUPLING
ADAPTER
OVAL DUCT
3½"
Showing by dotted line how Oval Duct can be used throughout without using rigid conduit; can be installed after partition is finished by channeling slot in plaster.
METAL LATH
OVAL DUCT
2, ⅞" outlet boxes bolted back to back.
Wire from here to both fixtures
Splice metal lath and run into joint between boxes
FRONT VIEW WITHOUT FIXTURE AND PLASTER
SECTIONAL ELEVATION
DETAIL OF TWIN OUTLET BOXES SERVED BY SINGLE OVAL CONDUIT FOR ELECTRIC LIGHT FIXTURE ON BOTH SIDES OF SOLID PARTITION
ABOVE-DETAILS OF OVAL CONDUIT AND SHALLOW BOXES
BELOW-DETAILS OF WIRING RACEWAYS
STANDARD OCTAGON-OR-SQUARE-OUTLET-BOX
COVERS OBTAINABLE IN DEPTHS FROM ⅛" TO 1¼"
STD. BOX CONNECTOR
PLAN
FRONT ELEVATION
RIGID CONDUIT OR CABLE ATTACHED TO EITHER BOX FROM ENDS OR TOP OR BOTTOM; ONE CONNECTION SUPPLYS BOTH BOXES.
SECTIONAL ELEVATION
OUTLET BOXES ARRANGED IN TANDEM FOR BOXES IN ADJOINING ROOMS
RIGID CONDUIT
2"
PLASTER
BASE RECEPTACLE
EXTENSION BOX
CONCRETE SLAB
FINISHED FLOOR
ELEVATION WALL BOX WITH DOUBLE OPENING
SWITCH BOX ON CHANNEL SIDE OF PARTITION SHOWN DOTTED
ARMORED CABLE OR RIGID CONDUIT
SWITCH BOX OR BRACKET OUTLET
METAL LATH CHANNEL STUD
METAL LATH
FURRING STRIP "A"
TRIM
DOOR BUCK 2x2
DOOR
WIRE TIE
NOTE-WHERE CONDUIT IS USED IN BOTH SIDES OF PARTITION, FURRING STRIP "A" SHOULD BE AS SHOWN DOTTED
ELECTRICAL CONDUIT
METAL LATH
SECTION-A-A
NOTE DETAIL OF C-C SIMILAR
CHANNELS
TRIM
BASEBOARD
CONDUIT
ELEVATION
GROUNDS
REMOVABLE BASE
ELECTRICAL CONDUIT
PLASTER ONE COAT BEFORE INSTALLING CONDUIT
SECTION-B-B
SWITCH BOX SET ON CHANNEL SIDE OF PARTITION
SWITCH BOX SET ON LATH SIDE OF PARTITION
2" SOLID PLASTER
METAL LATH WIRED TO STUD
NOTE SWITCH BOX CAN BE SET VERTICALLY OR HORIZONTALLY
SECTIONAL PLAN

Details of Electrical Installations.

SOLID METAL LATH PARTITION DETAILS.

Fig. 32

No. 6 Wall or Standing Furring

Weights of Metal Lath:

Expanded metal lath, flat rib lath or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard shall be used on studs spaced up to and including 12 inch centers. For studs spaced over 12 inches and up to 16 inches on centers, use expanded metal lath or flat rib lath weighing not less than 3.0 lbs. per square yard or ⅜ inch rib lath weighing not less than 2.5 lbs. per square yard. For studs spaced over 16 inches and up to 24 inches on centers ⅜ inch rib lath weighing not less than 3.0 lbs. per square yard shall be used.

Furring Channels:

Horizontal furring channels, where placed against masonry wall, shall be ¾ inch hot or cold rolled channels. Where located some distance from masonry and braced therefrom with band iron or channel, they shall be not less than 1 inch hot or cold rolled channel. In the latter case, horizontal channels shall be braced from masonry at not over 4 feet centers. Vertical spacing of horizontal channels shall not exceed 4 feet 6 inches on centers.

Vertical furring channels shall not be less than ¾ inch hot or cold rolled channels and shall be spaced in accordance with the weight of lath used as above specified.

Tie Wire:

Tie wire shall be not less than No. 18 gauge galvanized wire.

Erection of Furring Channels:

Horizontal furring channels where erected against masonry walls shall be laid flat with a nail dropped between channel and wall to separate same to permit wiring vertical channels. Horizontal channels shall be secured to wall with 1½ inch cut stub nails driven into masonry joints or by hardened masonry nails driven into concrete.

Where placed away from masonry walls (to provide pipe or duct spaces) horizontal furring channels shall be anchored therefrom by channel or band iron braces. Same shall either be built in at time wall is constructed or attached thereto by means of hardened masonry nails, wall plugs or other approved methods. See Pages 24, Fig. 33.

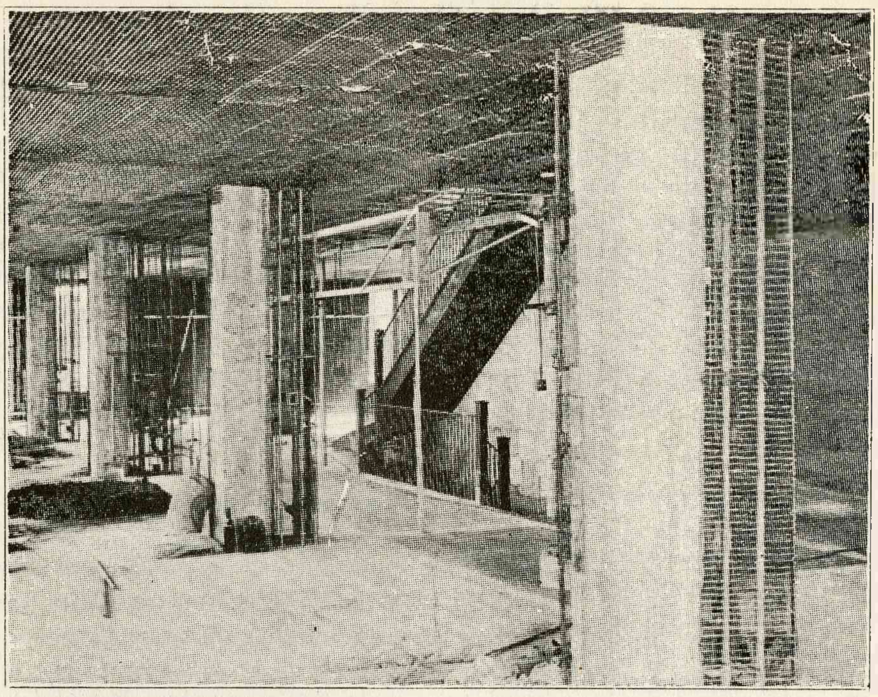
Vertical furring shall be securely saddle tied to horizontal furring channels by not less than No. 18 gauge galvanized wire. Care shall be taken to see that vertical furring is securely anchored at floor and ceiling. See Page 24, Fig. 33.

Erection of Metal Lath:

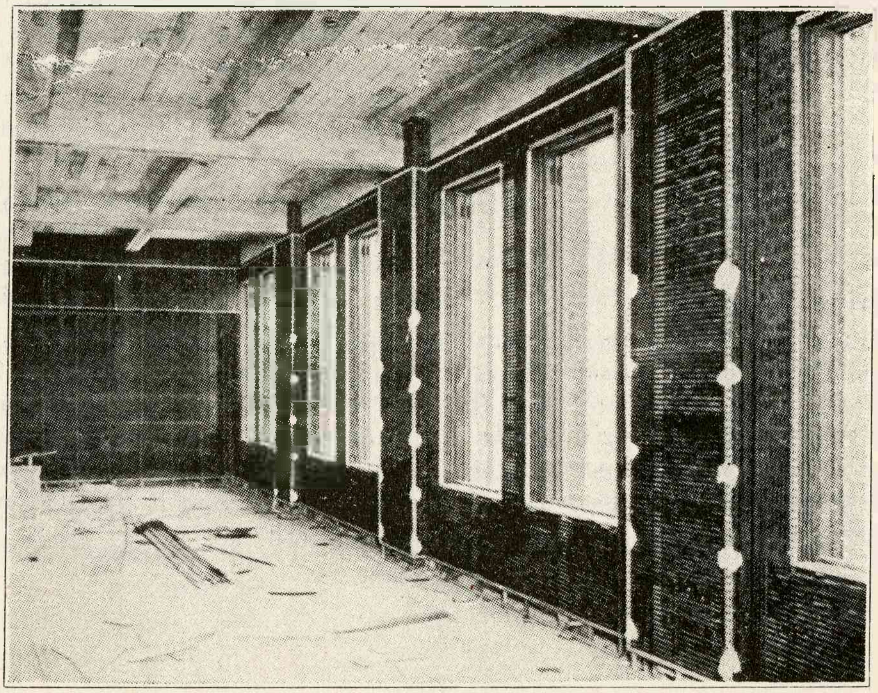
Metal lath shall be applied to the furring channels with the long dimension of the sheet across the studs, ends of sheets shall be staggered one above the other. Lathing shall commence at top and be carried down, the edge of the lower sheet lapping over the upper one. If metal lath is not used on ceiling, the lathing will start at top of wall and be bent and carried over 3 inches on to the ceiling so that no joints occur at juncture of ceiling and wall. On walls, lath shall be started one stud away from corner and be bent into angle and carried onto the abutting wall to avoid a joint at juncture of walls; provided, however, that where ⅜ inch rib lath is used it shall be butted into all corners and strips of Cornerite shall be securely wired along each edge in all corners.

Sheets shall be wired to vertical furring at intervals not exceeding 6 inches and a tie shall occur where sides of sheets lap at channels. There shall be one tie on side laps half way between channels.

Metal lath shall be lapped at sides not less than ½ inch and at ends not less than 1 inch. End laps of sheets shall generally occur only over channels; if between channels, sheets shall be securely laced with No. 18 gauge galvanized wire. Rib lath shall be lapped at sides by nesting outside ribs and at ends 1 inch.



There is no better way to conceal steam pipes and conduits than with metal lath furring.



Note use of lath, corner bead and ¾ inch channels for furring around pipes and window frames.

Fig. 33

No. 7 Stucco Construction
(New and Old)

Weights of Metal Lath:

Expanded metal lath, self furring lath, flat rib lath or $\frac{3}{8}$ inch rib lath for studs or supports spaced not greater than 16 inches on centers, shall weigh not less than 3.0 lbs. per square yard. Lath cut from galvanized sheets is recommended.

Furring Strips:

Furring strips, if used, shall be metal pencil rods of a diameter not less than $\frac{3}{16}$ inch or may be crimped metal not less than $\frac{1}{2}$ inch wide by No. 22 gauge. Furring strips are not required if self-furring lath is used or if lath is applied with self-furring attachments which insure at least $\frac{1}{4}$ inch stucco behind lath.

Tie Wire, Nails, etc.:

Tie wire shall be not less than No. 18 gauge galvanized wire.

Metal lath shall be attached to wood supports by not less than $1\frac{1}{4}$ inch large head nails spaced not to exceed 6 inches on centers. If galvanized lath is used it is recommended that nails also be galvanized.

Preparation of Old Exterior:

Where siding or shingles have been used for the wall covering they shall be examined as to their present condition. Any loose siding or shingles shall be renailed and, if defective, shall be replaced. All door and window trim shall be extended so that it will have the proper projection beyond the finish face of the stucco.

Apply zinc or equal flashing liberally over all window and door openings, over water tables, as a drip under window sills, at intersection of stucco parapet walls and porch deck or roofs, at ends of window sills and elsewhere where water might get behind stucco.

A substantial building paper or membrane thoroughly waterproofed shall be laid in horizontal layers over the old siding, shingles or sheathing, lapping lower edge of each strip 2 inches over the one below. Where paper-backed metal lath is used the use of building paper is unnecessary.

On old masonry walls where practicable, extend old masonry sills or belt courses by driving masonry nails into joints or into concrete. Attach metal lath reinforcing to nails and pour concrete extension into forms built around nails or apply with trowel. Where impracticable to extend in this manner, heavy flashing shall be provided over sill and extending under wood sill and project at least 1 inch beyond new stucco surface. Apply flashing at all interesections where water might get behind stucco.

Where surface of old masonry wall is porous, apply damp-proofing paint preferably. Waterproof building paper may be used if mortar joints are easily driven into.

New Exteriors:

Wood studs shall not be less than 2 x 4 inch spaced not to exceed 16 inches on centers. Studs shall be braced midway between story heights with horizontal bridging and at each corner of building at each floor with not less than 1 x 4 inch diagonal bracing, the slope or angle of which shall be such that each brace shall tie together not less than the upper or lower half of the three studs adjacent to the corners.

Where walls are of wood construction at least one layer of quilting felt or other form of insulation shall be supplied as insulation between the interior and exterior face of studs. The space between the studs at their juncture with the floor and ceiling joists shall also be properly firestopped with basket-shaped metal lath fitted between studs, coated with plaster or cement and filled with incombustible materials to 3 inches above floor levels.

Sheathing shall be laid horizontally and substantially nailed to each stud and covered with waterproofed building paper applied so that bottom strip shall lap over base board at bottom of wall and upper strips shall lap over lower strips at least 2 inches.

On new masonry walls the underside of masonry sills and other horizontal courses shall be provided with a drip cut so water will fall beyond face of stucco and a groove should also be cut on underside of such masonry to provide a key for stucco. Apply flashing at all intersections where water might get behind stucco.

Erection of Metal Lath:

Metal lath shall not be applied until all exterior carpentry repairs, structural alterations, flashing and damp-proofing are completed.

All metal lath shall be erected with the long dimension of sheet horizontal, self-furring lath with the furring against supports.

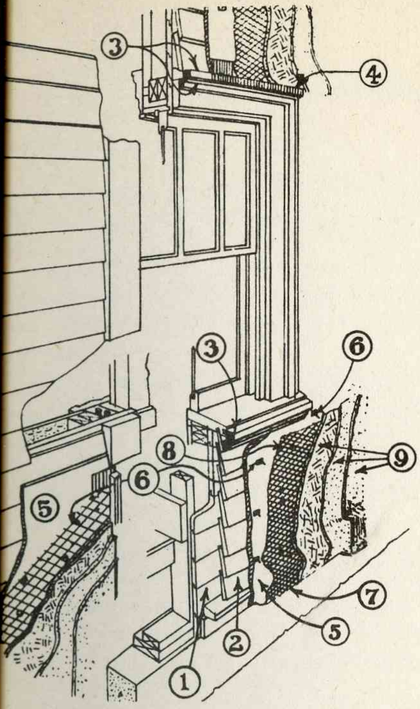
If flat expanded metal lath is used self-furring nails or devices shall first be driven through waterproof paper into sheathing, old siding or shingles, after which lath shall be applied over them and secured to the supports. When metal furring strips are used they shall be nailed at the same time as lath, the strips being applied vertically on about 12 inch centers directly over paper and nailed every 12 inches. Furring strips are not required for self-furring lath which is applied with the furred portion against paper and nailed directly over paper to sheathing, old shingles or siding.

Application of sheets of lath shall commence at the top right hand corner of building, one st away from corner, bending sheets around angle and carrying them on to the abutting wall, that no joints shall occur at corners; provide however, that where self-furring lath is used, shall be started at the corner and Cornerite secure wired along each edge shall be placed in all corne Cornerite shall not be fastened at the corner b only along each edge.

Lath shall be placed so that the lower sheet la over the upper and shall be securely attached supports. Lath shall be lapped at sides not l than ½ inch and at ends not less than 1 inch a lapping shall be arranged, whenever possible, so to approximately match openings in one sheet lath with those of others to facilitate keying stucco.

Where furring nails or strips are more than inches apart horizontally at side laps, laps shall tied at least once between nails, etc.

SPECIFICATIONS FOR METAL LATH CONSTRUCTION



Old Sheathing.

Old Siding or Shingles.

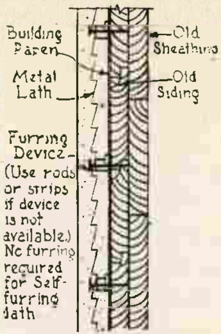
Extension of window caps and sills.

Flashing: Use liberally wherever ater might get behind stucco.

Waterproof Building Paper.

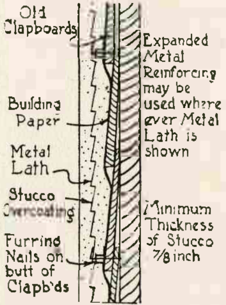
Furring: For Flat Lath or Expanded etal Reinforcing fur with special nails hen available; otherwise use metal rips. Avoid use of wood furring. No rring required for self-furring lath.

Expanded Metal Reinforcing or Metal ath:



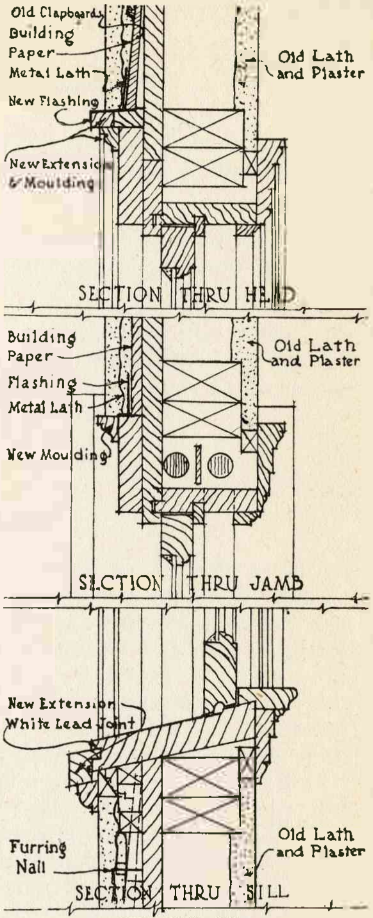
Building Paper
Metal Lath
Furring Device (Use rods or strips if device is not available.) No furring required for Self-furring lath
Old Sheathing
Old Siding

DROP SIDING

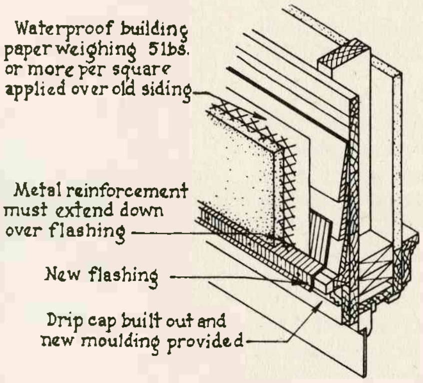


Old Clapboards
Building Paper
Metal Lath
Stucco Overcoating
Furring Nails on butt of Clapb'ds
Expanded Metal Reinforcing may be used where ever Metal Lath is shown
Minimum Thickness of Stucco 7/8 inch

CLAPBOARDS

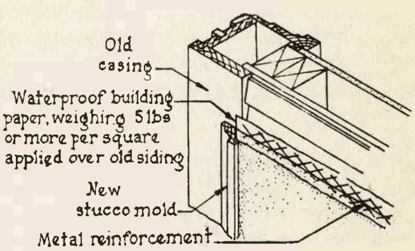


DETAILS OF OVERCOATING AT WINDOWS



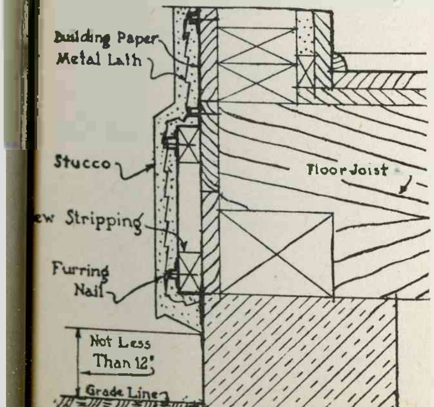
Waterproof building paper weighing 5 lbs. or more per square applied over old siding
Metal reinforcement must extend down over flashing
New flashing
Drip cap built out and new moulding provided

DETAIL OF WINDOW HEAD

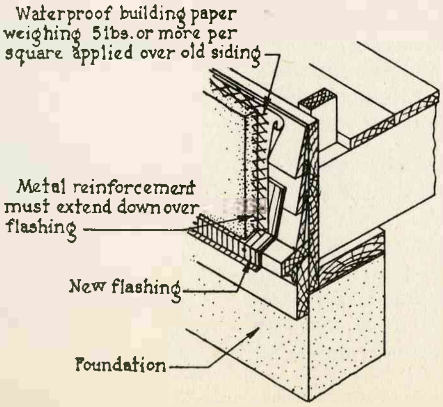


Old casing
Waterproof building paper, weighing 5 lbs or more per square applied over old siding
New stucco mold
Metal reinforcement

DETAIL OF WINDOW JAMB

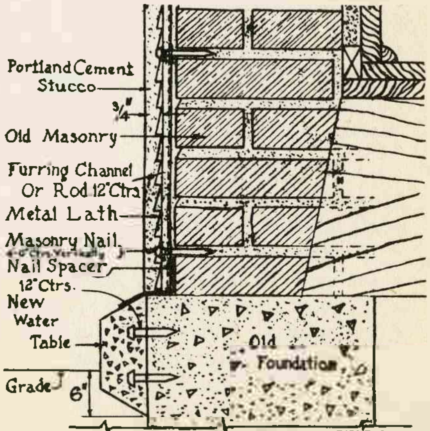


FRAME CONSTRUCTION AT WATER TABLE



Waterproof building paper weighing 5 lbs. or more per square applied over old siding
Metal reinforcement must extend down over flashing
New flashing
Foundation

DETAIL OF WATERTABLE



DETAILS OF OVERCOATING OVER MASONRY.

Fig. 34

CONCRETE STUCCO REMODELING DETAILS

No. 8 Metal Lath for Industrial Construction

Weights of Metal Lath:

Sidewalls: As a plaster base for all outside walls ⅜ inch rib lath shall be used and shall weigh not less than 3 lbs. per square yard for supports spaced up to 24 inches on centers; 3.5 lbs. per square yard for supports spaced from 24 to 30 inches and 4 lbs. per square yard for supports spaced from 30 to 36 inches on centers.

As a reinforcement for long span Portland Cement sidewalls, of a minimum thickness of 2 inches, on structural steel supports, not less than ¾ inch rib lath shall be used of a minimum weight for various spacing of supports as specified by the manufacturers specifications.

Floors and Roofs: As a reinforcement and centering for 2 inch concrete slabs ⅜ inch rib lath shall weigh not less than 3 lbs. per square yard for spans 12 to 16 inches; 3.5 lbs. per square yard for spans 16 to 19 inches, and 4 lbs. per square yard for spans 19 to 24 inches on centers.

As a reinforcement and centering for greater slab thicknesses and greater spans not less than ¾ inch rib lath shall be used of the proper weight for safe load requirements and maximum spans as centering as specified by the manufacturers engineering design tables.

Studs:

For 2 or 2¼ inch solid walls up to 14 feet in height, channel studs shall be not less than ¾ inch hot or cold rolled channels; over 14 feet and up to 20 feet in height not less than 1 inch hot or cold rolled channels shall be used. Length of walls between columns, walls or other vertical structural members shall not be greater than two times the wall height when latter is 12 feet or more.

Tie Wire and Clips:

Wire for tieing lath end laps and side joints shall be not less than No. 18 gauge galvanized soft annealed wire.

Rib or plate clips shall be of approved design.

Bracing:

On roofs with a pitch of 10% or more, one row of sag rods should be provided to purlins for spans from 10 to 12 feet and two rows for spans from 12 to 18 feet.

Expansion Rods:

For roofs where width of building is over 250 feet in a direction at right angles to the main ribs of the lath, ¼ inch pencil rods shall be spaced not over 30 inches apart over ribs and at right angles to them.

For floor slabs ¼ inch pencil rods shall be placed 18 inches on centers on top of lath and at right angles to them.

For walls and sidings where main ribs of the lath run vertically ¼ inch pencil rods shall be attached to rib side of lath and spaced not over 24 inches on centers at right angles to ribs.

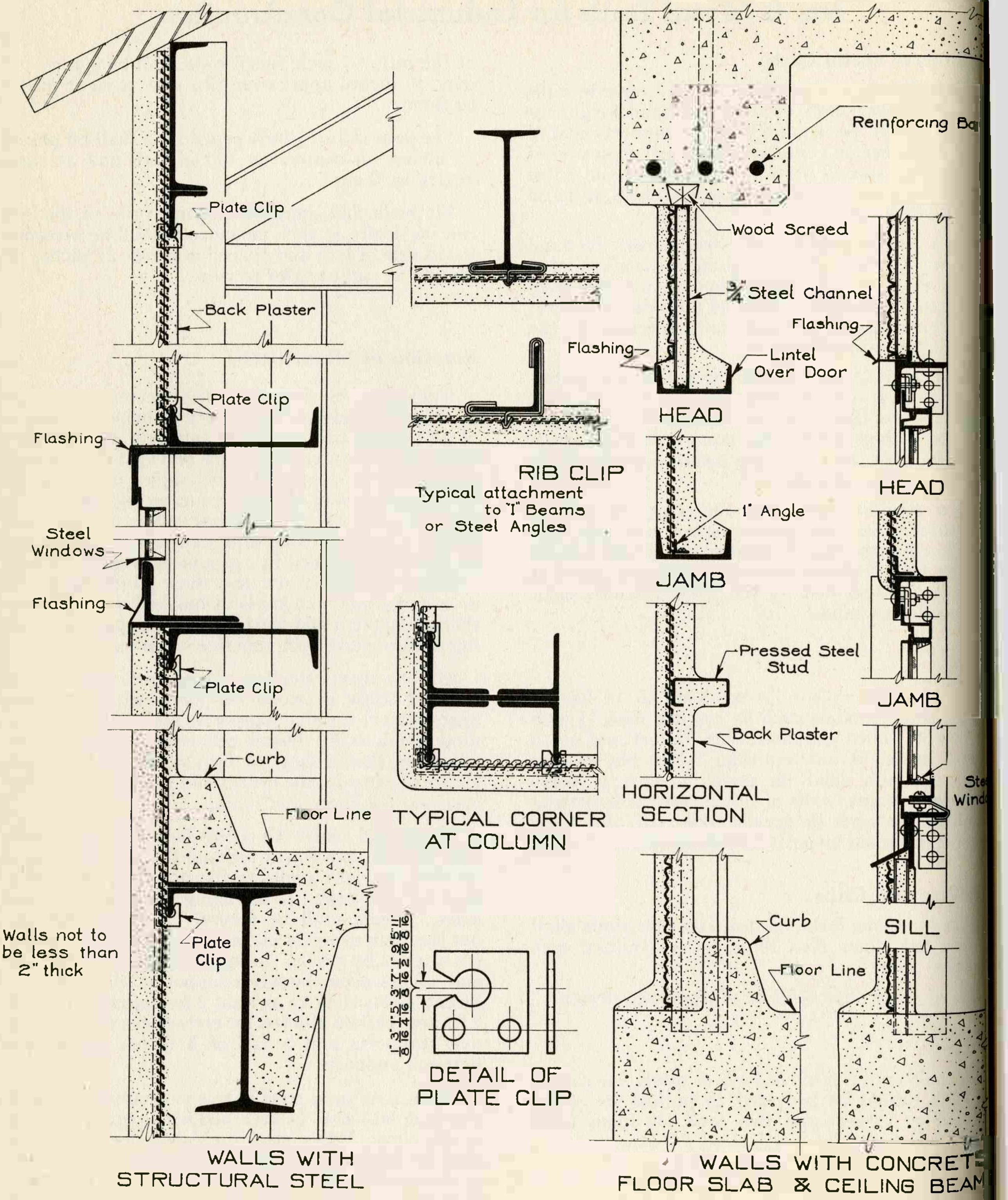
Erection of Metal Lath:

Sidewalls: All rib lath shall be securely attached to channel studs at least every 8 inches by means of galvanized wire; to wood supports with not less than 1¼ inch large head nails or 1½ inch 14 gauge galvanized or coppered wire staples at every rib and support, and to steel framing by heavy galvanized wire or rib or plate clips of approved design. For attaching lath to concrete, lath shall be securely anchored in a groove provided in floors, ceilings or columns not less than 1 inch deep and as wide as total thickness of finished wall. Plaster shall be applied and worked well into groove forming a tight joint with concrete construction.

All lath sheets shall be placed with ribs against channel studs or wood supports; with lath side against steel framing supports; and with ribs running horizontally unless otherwise specified. All adjoining sheets shall be interlocked at sides and ends and outside ribs nested and tied as hereinafter specified for floors and roofs.

Floors and roofs: All metal lath shall be placed with lath surface downward and the long dimension of sheets at right angles to the supports. All sheets shall be interlocked to adjoining sheets at ends and sides. Sheets shall be securely fastened together not less than every 24 inches on long sides and every rib at ends by wiring through lapped ends. Where end splices occur between supports, splices in adjacent sheets shall be at least 2 feet apart. A lap of 2 inches shall be allowed for end splices which occur over supports and a lap of 8 inches for splices between supports.

When structural steel beams or channel supports are used, lath shall be attached with approved plate or rib clips. When steel bar joists are used, lath shall be attached by means of approved wire clips or wire tying. When wood supports are used lath shall be attached at each rib at every support with not less than 1¼ inch large head nails or 1½ inch 14 gauge galvanized or coppered wire staples.



WALLS WITH STRUCTURAL STEEL

RIB CLIP

TYPICAL CORNER AT COLUMN

DETAIL OF PLATE CLIP

HEAD

JAMB

HORIZONTAL SECTION

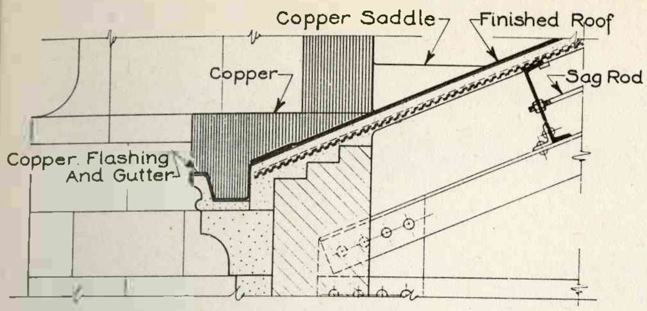
HEAD

JAMB

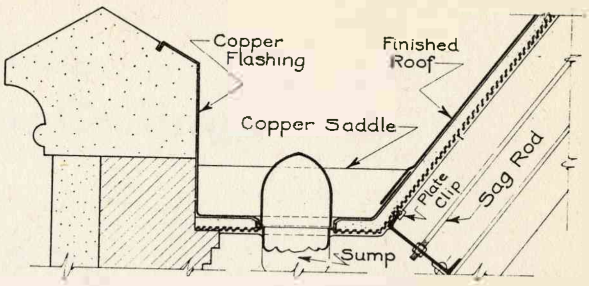
SILL

WALLS WITH CONCRET
FLOOR SLAB & CEILING BEAM

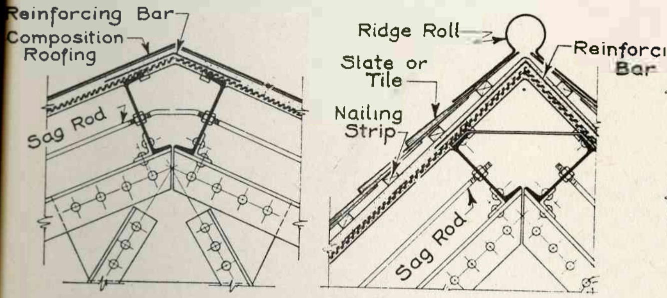
Fig. 35



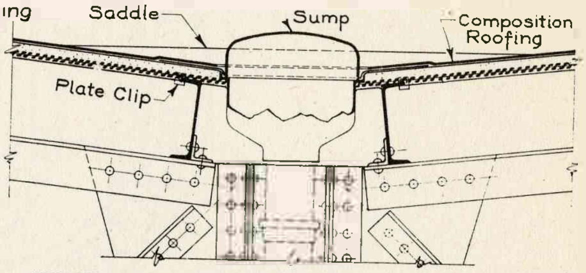
TYPICAL CORNICE DETAIL ROOF FOR MONUMENTAL BUILDINGS



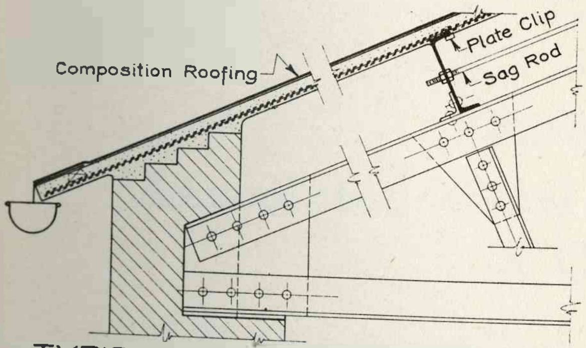
ROOF WITH GUTTER AND PARAPET FOR MONUMENTAL BUILDINGS



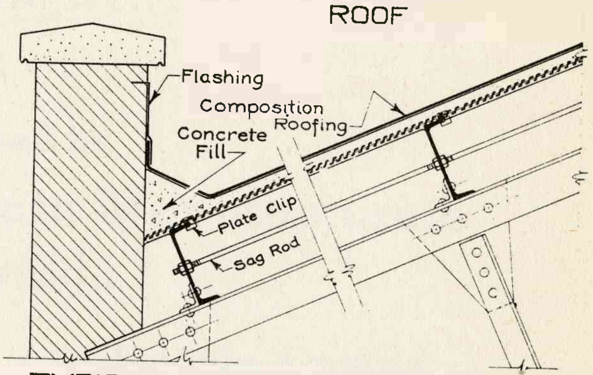
TYPICAL RIDGE DETAILS



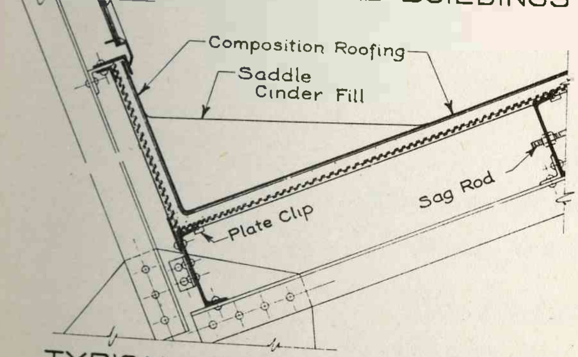
TYPICAL SUMP DETAIL FOR FLAT ROOF



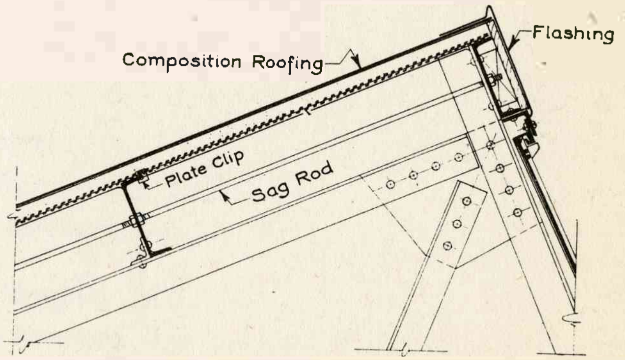
TYPICAL EAVE FOR SLOPING ROOF ON INDUSTRIAL BUILDINGS



TYPICAL GUTTER DETAIL WITH ROOF AND PARAPET



TYPICAL VALLEY IN SAWTOOTH ROOF

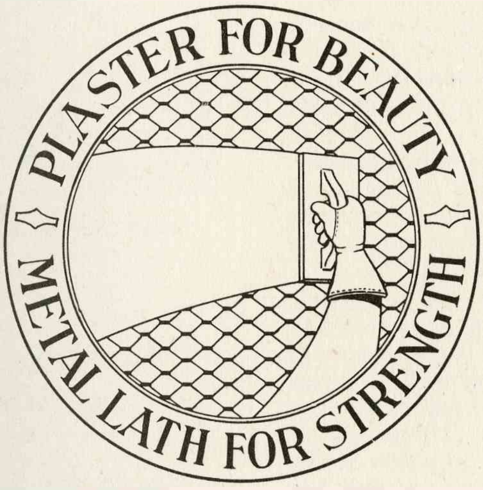


TYPICAL RIDGE IN SAWTOOTH ROOF

Fig. 36

Section No. II

Metal Lath for Ceilings



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The Pedlar People, Ltd.
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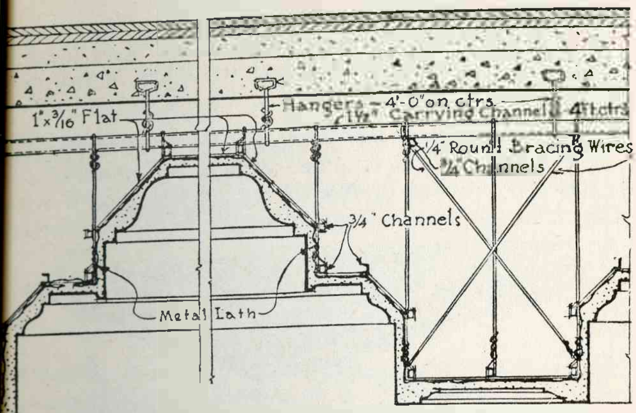
R.A.I.C. FILE No. 20

Section No. II. Metal Lath for Ceilings



Typical Cornice and False Beam Suspended from Concrete Slab.

Fig. 37

Structural Superiority of Metal Lath Ceilings

Fire Resistance:

The growing fire hazard due to civic congestion and the vast increase in suburban development where fire fighting facilities are often woefully inadequate, is one problem the careful architect of today must cope with.

Metal lath in connection with three-coat plastering gives a full one hour fire safety rating—ample protection for either city or suburban dwellers from interior conflagrations that may occur. It is an actual reinforcement. When the plaster is subject to intense heat, the sharp teeth and keys hold it in place as an effective check to the passage of flames.

Vibration:

The plaster on the ceiling is subject to more vibration and strain than any other part of the room. Naturally it is the greatest source of trouble from falling plaster and unsightly cracks which detract from the appearance of decorations. Metal lath literally locks the plaster to the ceiling and makes it a reinforced slab that is crack-proof and fireproof.

Discolored Plaster:

A leaky radiator, an overflow from a basin or even the steam arising from the laundry or kitchen will discolor, crack or stain plaster on wood lath. This danger is eliminated with metal lath. Ordinary leakage will not ruin a reinforced plaster surface.

The co-efficient of expansion and contraction of steel and mortar is the same. Temperature changes have, therefore, no effect on steel reinforced plaster. Unlike wood lath the metal exudes no excretions to stain and mar the finished surface.

Plastering on metal lath can, in consequence, be safely decorated with finest mural paintings or other finest decorative treatments.

Patching and Renovizing:

Renovizing and patching the plaster in the interior of a building is not merely a passing fancy. The work should be permanent and the new surfaces should be beautiful and not the temporary makeshift substitutes for plaster which the eye quickly detects.

Some of the substitutes for plastering are serious fire hazards. Most of them are neither vermin nor germ proof and are a real health hazard in event of contagious diseases.

In the photograph at bottom of this page is shown the simple, easy and economical manner of patching a fallen plaster ceiling. Note that it is not necessary to remove the old lath as the new metal lath is applied directly over the old wood lath. In some forms of pre-cast plaster lath used in suspended ceilings it is necessary to remove whole strips of undamaged plaster and lath from one side of the room to the other in order to patch or replace damaged lath. This is not true of metal lath as it can be quickly and cheaply repaired by wire tying or nailing a new piece of lath to the existing lath or supports without disturbing the undamaged ceiling.

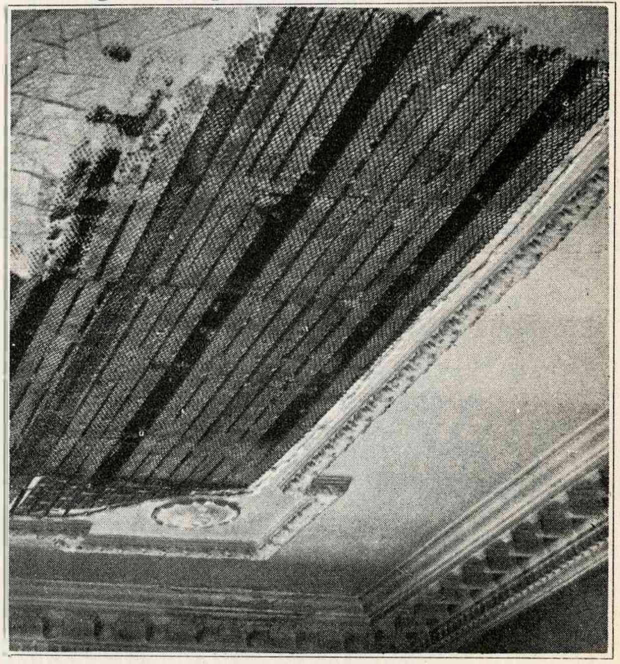


Fig .43

Types of Ceilings:

There are two general types of ceiling construction, attached ceilings (contact or furred) and suspended ceilings.

Attached Ceilings:

Attached ceilings are in direct contact with the construction above, the metal lath being attached directly to the underside of the structural members of the ceiling or roof.

In certain types of construction where the spacing of the structural members is greater than permitted for support of type and weight of metal lath used, small steel furring channels are attached to the structural members to provide the correct spacing of supports and the metal lath is then attached to these furring bars.

Wood Joisted Buildings:

In wood joisted structures the metal lath may be attached directly to the underside of joists, 1¼ inch large head nails spaced not over 6 inches apart being used to secure the lath.

It is recommended, however, that 1 inch by 2 inch furring strips be securely nailed across the wood joist at 12 inch centers and the lath applied over these furring strips. This method of construction further eliminates the possibility of plaster cracks due to deflection of any one or more joists and also permits the use of a lighter weight lath than permitted on joists spaced 16 inches on centers.

For residence construction where wood joisted floors are used extensively, metal lath and plaster should be installed on ceilings of furnace and fuel storage rooms for the fire retardance qualities of this construction. As an alternate to other types of plaster base, it is also recommended that the ceilings of entrance halls, living and dining rooms and main bed rooms as well as partitions around stair halls be lathed with metal lath to prev
cracking and streaking.

Fireproof Buildings:

Figures 3, 38-39 and 40 show methods used
attaching metal lath to various types of firep
ceilings.

Where steel or bar joists are used, as in Fig.
the metal lath is attached directly to undersid
joists by means of No. 18 gauge galvanized w

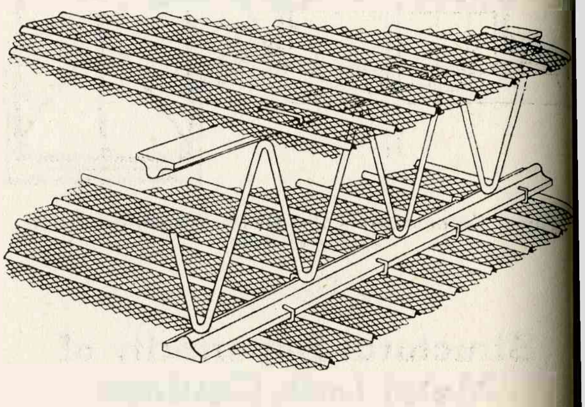
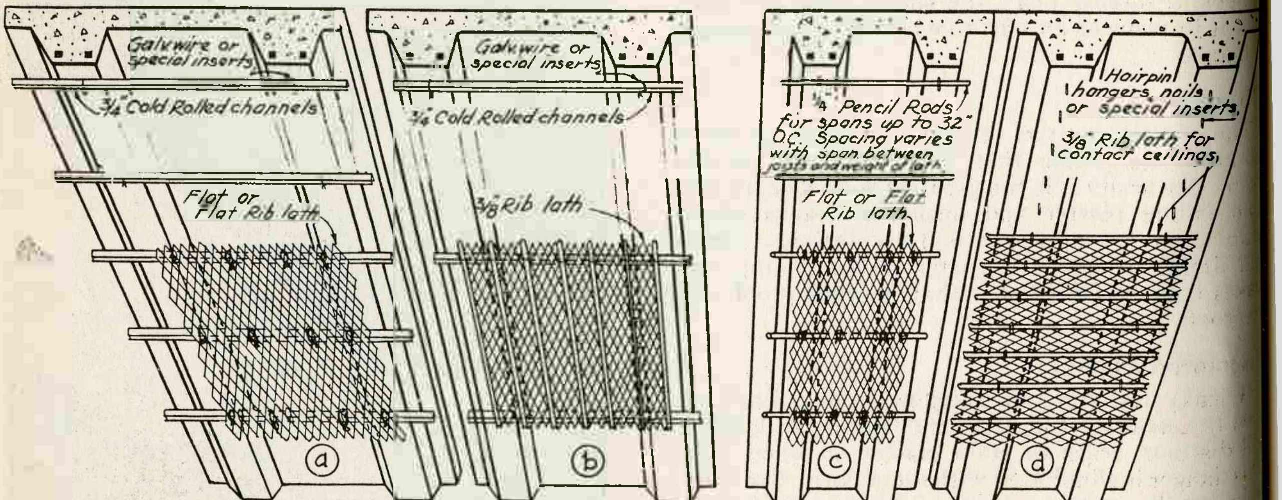


Fig. 38

In this type of construction the usual spacing
such that ⅜ inch rib lath may be attached directl
to joist without furring rods or flat lath weighin
not less than 3 lbs. per square yard tied to ¼ inc
pencil rods spaced at 12 inch centers.

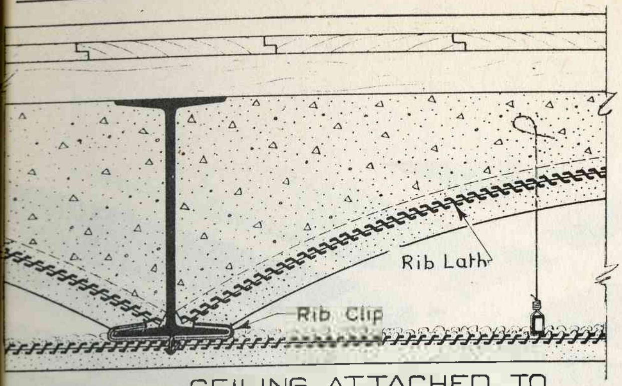
Where structural steel beams and concrete arche
form the ceiling as in Fig. 40, the metal lath
attached to ¾ inch furring channels which a
secured to steel beams with rib or clip plate


Galvwire or special inserts
¾" Cold Rolled channels
Flat or Flat Rib lath
ⓐ
Galvwire or special inserts
¾" Cold Rolled channels
⅜ Rib lath
ⓑ
¼ Pencil Rods for spans up to 32" O.C. Spacing varies with span between joists and weight of lath
Flat or Flat Rib lath
ⓒ
Hairpin hangers, nails or special inserts
⅜" Rib lath for contact ceilings
ⓓ

(a) Channel Furring, Flat Lath; (b) Channel Furring, Rib Lath; (c) Rod Furring, Flat Lath; (d) Contact Ceiling, Rib Lath.

DETAILS OF METAL LATH CEILINGS UNDER CONCRETE JOISTED FLOORS

Fig. 39



CEILING ATTACHED TO
"I" BEAMS IN ARCHED CONCRETE FLOOR

Fig. 40

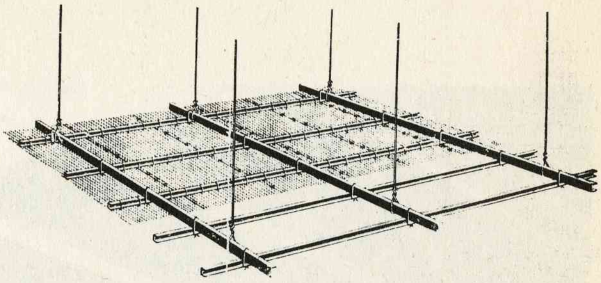


Fig. 41

Additional hangers of not less than No. 9 gauge galvanized wire inverted in the concrete arches before pouring, serve to support the furring channels between beams. The spacing of the furring channels is determined by the type and weight of lath to be used.

Metal lath under concrete joisted ceilings is erected in the various manners shown in Fig. 39.

Suspended Ceilings:

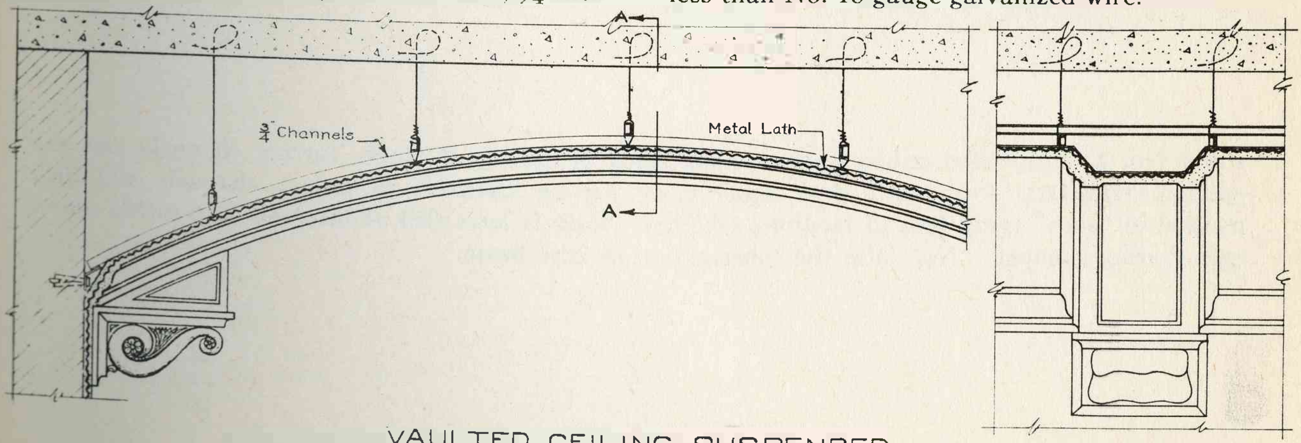
A suspended ceiling differs from an attached ceiling in that it is suspended from and is not in direct contact with the construction above. In this type of ceiling runner channels are suspended from the ceiling or roof construction by means of wire or band iron hangers and to these runner channels small furring channels running at right angles to the runner channels are securely wired. The metal lath is then attached to the furring channels, the whole construction being suspended from and not in contact with the structural members above.

In Fig. 41 is illustrated a flat ceiling suspended from the construction above by means of No. 9 gauge galvanized wire hangers. If desired, ¾ inch by ⅛ inch band iron may be used instead of the wire. The lower end of wire hangers should be wrapped twice around the runner channels and when band iron hangers are used the lower end of hanger should be bent at right angles to form a support for the runner channel which is wired securely to the hanger. The hangers should be spaced not to exceed 4 feet in both directions. Furring channels are wire tied to runner channels at centers to suit the weight of lath to be used.

Fig. 37 shows an ornamental ceiling and false beam suspended from a concrete floor.

The vaulted ceiling shown in Fig. 42 is suspended from the concrete slab by wire or band iron.

The minimum size for hangers should be No. 9 gauge galvanized wire or ¾ x ⅛ inch band iron spaced not to exceed 4 feet in both directions. Carrying or running channels should not be less than 1½ inch hot or cold rolled channels and should not exceed 4 feet on centers when carrying ¾ inch furring channels. The furring channels are spaced in accordance to type and weight of lath used and are securely wired to runner channels with not less than No. 18 gauge galvanized wire.



SECTION A-A

VAULTED CEILING SUSPENDED
FROM CONCRETE SLAB

Fig. 42

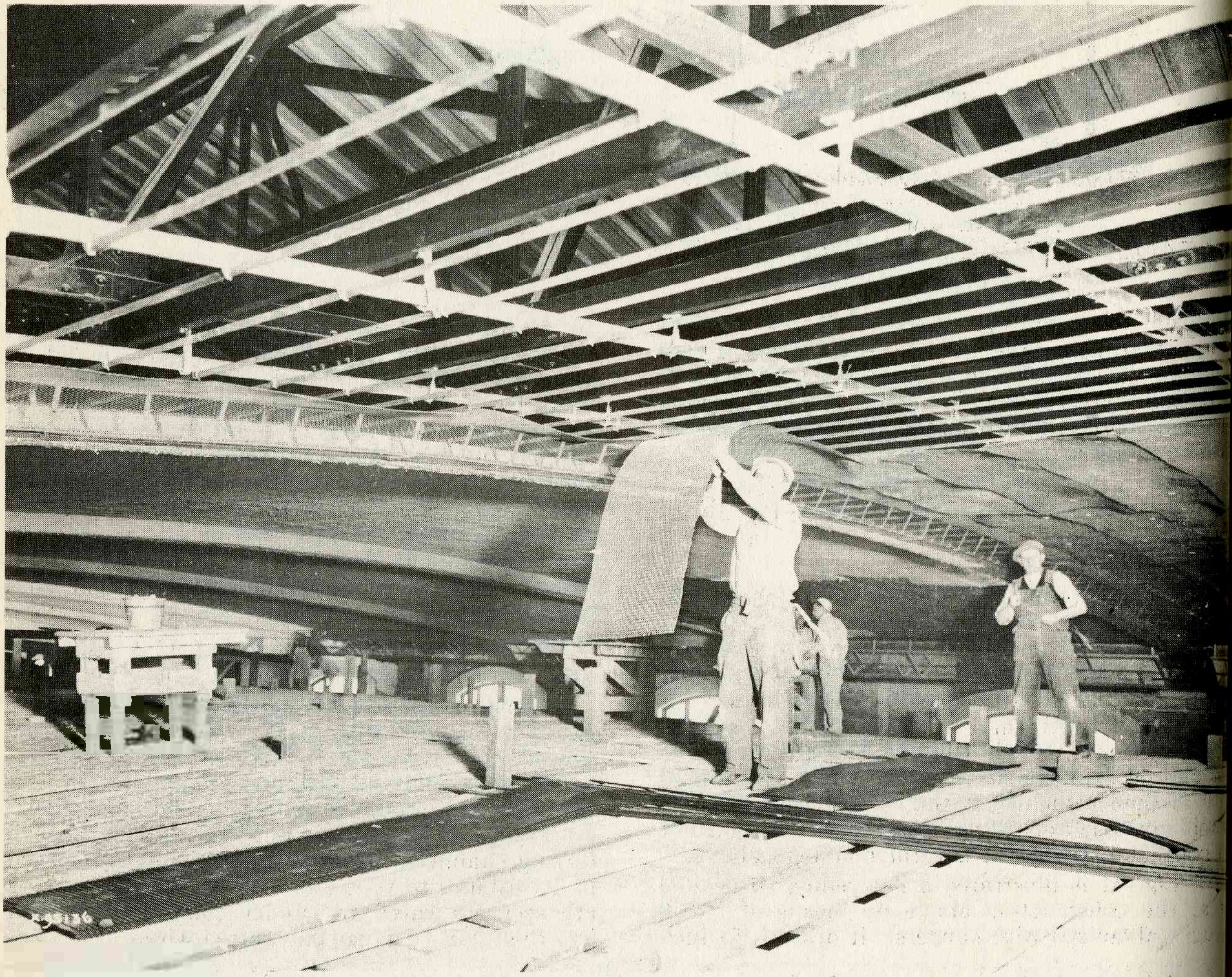


Plate No. 2. Suspended ceiling showing application of runner channels, furring channels and expanded metal lath. Note method of saddle tying furring channels to runner channels and also method of "spot" tying lath to facilitate erection. Lath is later tied at intervals of 6 inches along each furring channel. Note also the construction of false beam.

Section No. III

Metal Lath for Partitions

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Windsor, Ont. and Montreal, Que.

Section No. III Part "A"

Metal Lath For Partitions

There are three general types of metal lath partition construction: solid, hollow, and double.

Solid Metal Lath Partition:

A solid metal lath and plaster partition is a two-way steel reinforced vertical slab of plaster one and three-quarters to three inches thick. Studs consisting of small steel channels running from floor to ceiling stoutly anchor the partition to floor and ceiling and reinforce it vertically. The entire slab is fully reinforced horizontally and diagonally by sheets of metal lath which are securely attached to the studs and function both as plaster base and reinforcement. Consequently the construction acts as a unit to resist physical impact, wind, fire, water, sound or vibration. Other solid metal lath partitions are made with deep-ribbed lath, the ribs providing the rigidity otherwise supplied by the channels.

Structural Reasons for Superiority to Other Partitions:

Because of their unique reinforced construction these partitions resist impact, vibration or cracking much more effectively than partitions built of masonry or block units which seldom if ever are anchored to floor and ceiling and whose strength depends largely on their weight and somewhat carelessly filled mortar joints.

With their metallic reinforcement completely embedded in the plaster, metal lath partitions are much stronger than those in which the plaster is applied over thin sheets of precast paper-reinforced plaster. Without a metallic key and bond for the plaster the latter construction lacks the reinforcement necessary to resist fire and water nor do its many joints provide the requisite resistance to vibration and impacts which cause plaster cracks.

The plaster, whether portland cement, gypsum, lime or Keene's cement, used in solid metal lath and plaster partitions is applied with a trowel. The result is reinforced construction denser and stronger, and more rigid than is possible with thin partitions poured in place or made of unreinforced pre-cast units.

Hollow Partitions:

In hollow metal lath and metal stud partitions the lath is applied on both sides of wide single studs, usually 1½ or 2 inch channels, or on the outer face of double rows of channel studs each pair of which are held together by suitably designed spacers, the depth being determined by the space required for pipes, ducts, etc., to be concealed. For the common type of wood stud partitions the metal lath is applied on both sides of ordinary 2 by 4s or 2 by 6s. In each case the exposed surface of the lath is covered with approximately three-quarters of an inch of plaster.

Double (Soundproof) Metal Lath Partitions:

These are similar to the double studded hollow partitions with the exception that the spacers are omitted, additional reinforcing being provided when necessary in the hollow space, but each side of the partition is entirely independent of the other.

Choosing Solid, Hollow or Double Type:

Solid partitions are preferred where cost and space-saving are the important factors and no piping exceeding 1-inch in outside diameter is to be concealed. Hollow metal lath partitions on metal studs are recommended for fire-resistive separations to conceal service piping, rolling doors, etc.; those on wood studs are preferred for bearing partitions in non-fireproof buildings and for positions where such studs are required by the building code to have metal lath and plaster protection to provide one-hour fire retardance, and in general for better plastering in non-fireproof buildings. Soundproof Double Metal Lath partitions are particularly useful where special consideration is given to sound insulation. A typical installation of two-inch solid partitions in a wood joisted building with metal lath and plaster ceilings is shown in Fig. 44, Page 42.

Metal Lath and Lathing:

Metal lath is made from specially processed steel sheets slit or punched and then expanded or otherwise formed into a network or web of steel, containing numerous openings to facilitate the spreading of plaster and its keying to the steel. Each sheet of metal lath is covered with a special preservative paint or is cut from galvanized sheets. After the lath is in position in the building the plaster applied over it affords permanent protection to the steel.

Studs in metal lath partitions are usually ¾-inch cold or hot rolled channels, spaced from twelve to twenty-four inches on center depending upon the stiffness of lath used. The lath is secured to them by means of wire ties or prongs at intervals of approximately six inches.

Plastering—Showing Why the Partition is Called Solid:

With the studding and lath erected, grounds and electrical conduit are installed and the construction is given the first coat of plaster on one side. This coat having set it is then backed up solidly by a coat of plaster applied on the reverse side of the lath completely embedding it and the channels. Now plaster is again applied alternately on one side and then the other until channels, lath and conduit are fully embedded in a solid slab 2 to 3 i thick, as desired.

Hollow and Double Partitions—How Plastered:

For these partitions the plaster is appli several coats on the outer side of the two sep surfaces of lath until a plaster thickness of is reached on each side. Face to face thickn the hollow partitions is 3 inches and upward the double partitions 4¼ inches and upwards.

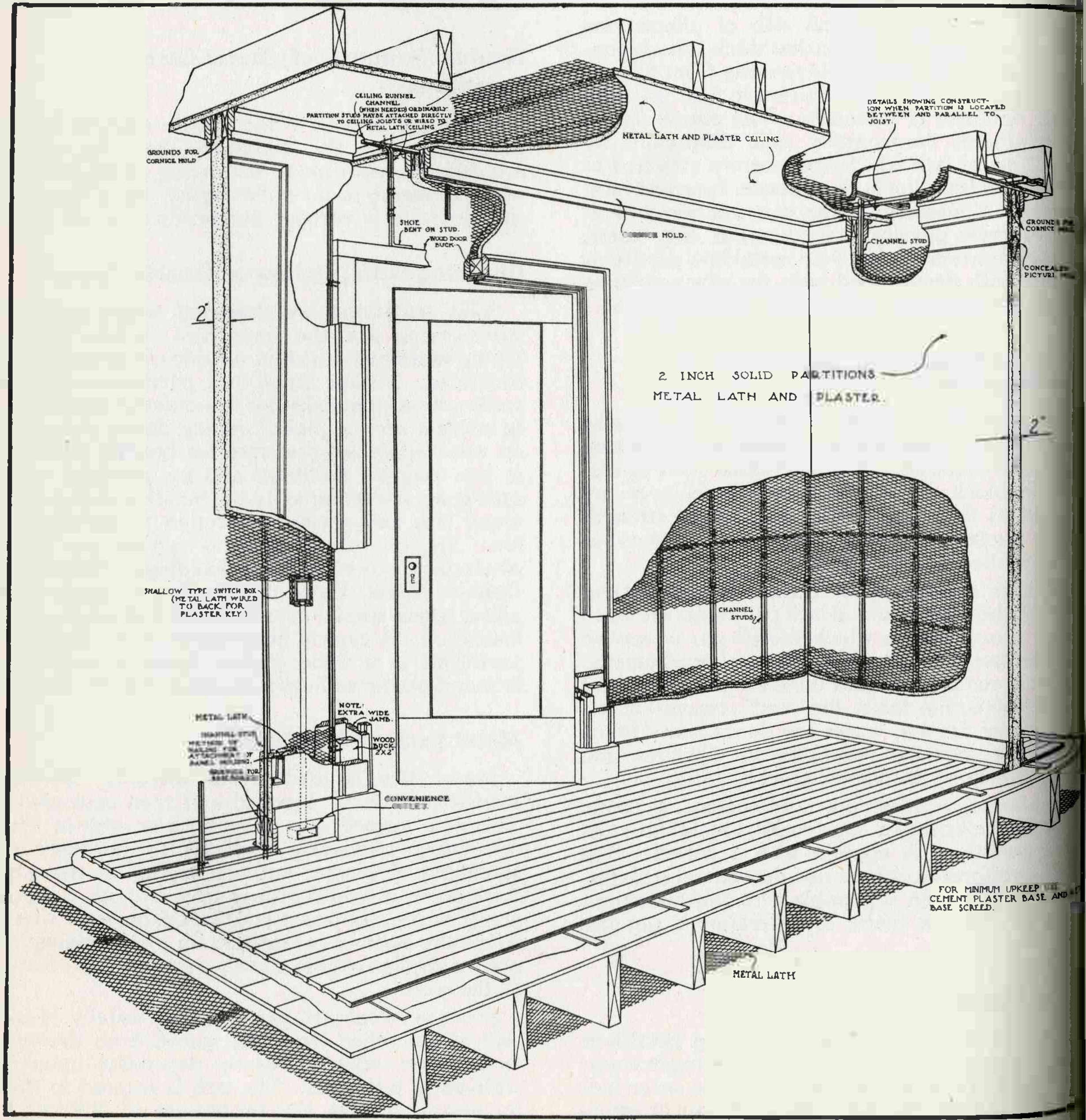

CEILING RUNNER CHANNEL (WHEN NEEDED) ORDINARILY PARTITION STUDS MAYBE ATTACHED DIRECTLY TO CEILING JOISTS OR WIRED TO METAL LATH CEILING
GROUNDS FOR CORNICE HOLD
METAL LATH AND PLASTER CEILING
DETAILS SHOWING CONSTRUCTION WHEN PARTITION IS LOCATED BETWEEN AND PARALLEL TO JOIST.
HOLD.
CHANNEL STUD
GROUND CORNICE
CONCEAL PICTUR
SHOE BENT ON STUD.
WOOD DOOR BUCK
2"
2 INCH SOLID PARTITIONS METAL LATH AND PLASTER.
2"
CHANNEL STUDS
SHALLOW TYPE SWITCH BOX (METAL LATH WIRED TO BACK FOR PLASTER KEY)
NOTE: EXTRA WIDE JAMB.
WOOD BUCK 2X2"
METAL LATH
CONVENIENCE
FOR MINIMUM UPKEEP CEMENT PLASTER BASE AND BASE SCREED.
METAL LATH

Fig. 44—Installation, Showing Typical Construction Details, of Two-inch Solid Metal Lath and Plaster Partitions in Wood Joisted Buildings

Seven Important Factors Determine Most Suitable Partitions

In the choice of type of partition to be used in the ubdivision of floor areas, consideration must be iven to the relative importance, for each building, f the following seven properties or characteristics f partitions:

(1) Cost,
(2) Space Saving,
(3) Sound insulation,
(4) Weight,
(5) Adaptability for occupancy requirements,
(6) Fire Resistance,
(7) Resistance to shocks and cracking.

Each factor varies in importance according to ype of building—whether full or partially fire esistive or ordinary construction, with the nature f occupancy and whether built for long-time nvestment, for speculation, or for monumental urposes (i.e., public library, city hall, etc.).

A survey of the entire building field and considration of the factors most often stressed by archiects, builders and owners show that the average elative order of importance for various types of ccupancy throughout the country is as given in able 1. In this tabulation, office buildings and otels are the modern type of full fire resistive onstruction. Mercantile buildings and hospitals re both slow-burning and fire resistive. Schools, partments and residential buildings are of ordinary onstruction and partial and full fire-resistive. The abulation does not cover portions of building used r special purposes such as music studios, gymasiums, etc.

One of the most important facts revealed by this able is the wide variance in importance requireents according to occupancy. Closer inspection, owever, reveals that space saving and cost are the wo most vital factors in the selection of types of artitions for a majority of all occupancies. Paricularly for buildings of the income-producing ype, the construction cost for each unit of rentable area must be reduced to the minimum as a small difference in net useful floor areas will ofttimes determine whether a project will be a success or a financial failure.

In schools and hospitals, fire protection is naturally the deciding factor. This, too, would govern for certain parts of all buildings—such as stairway and elevator enclosures. Sound insulating properties, of admittedly great concern to proprietors of hotels and apartments are nevertheless secondary to cost and space saving. Although no consideration need be given to the dead weight of partitions in low buildings such as schools and residences, it plays an important part in the design of tall office and hotel structures.

In the chapters to follow various partition materials and types of partition construction, particularly those consisting in large part of metal lath are discussed with a view to showing how they measure up to the characteristics and properties in greatest demand as shown by the foregoing analysis.

TABLE 1

Order of Importance of Properties of Partitions in Various Occupancies:

Factors	Office Buildings	Mercantile Buildings	Schools	Hotels, Dormitories, etc.	Hospitals	Apartments and Residential	Total Pts.	Weighted Order of Importance
Space Saving	1	2	4	1	2	2	12	1
Cost	2	1	3	2	4	1	13	2
Fire Resist	5	4	1	5	1	4	20	3
Sound Insul	6	7	2	3	3	3	24	4
Weight	3	5	7	4	5	7	31	5
Adaptability	4	6	5	6	6	5	32	6
Shock Resist	7	3	6	7	7	6	36	7

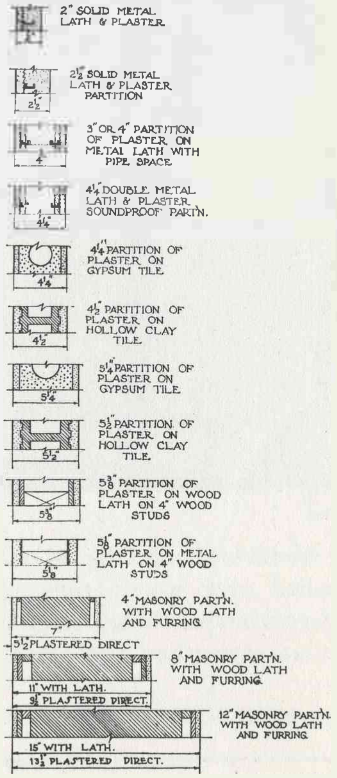
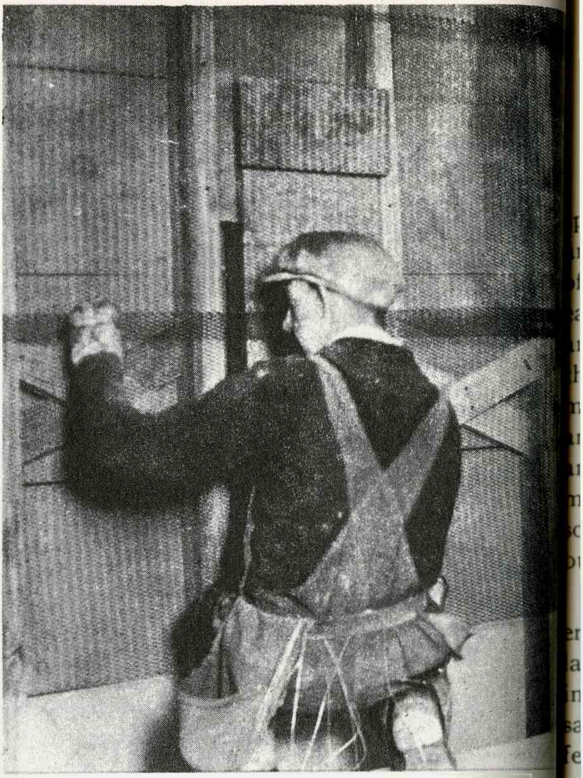
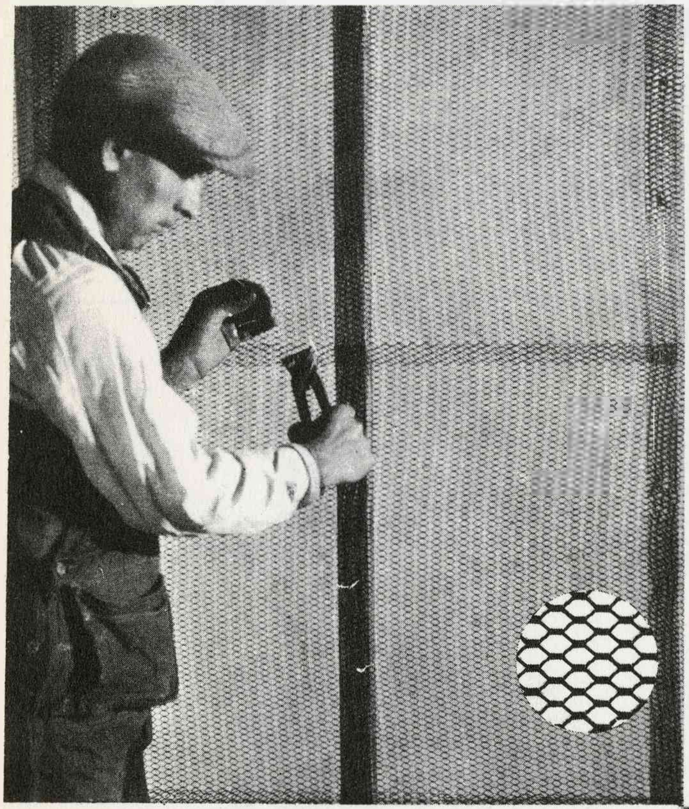

2" SOLID METAL LATH & PLASTER
2½" SOLID METAL LATH & PLASTER PARTITION
2½"
3" OR 4" PARTITION OF PLASTER ON METAL LATH WITH PIPE SPACE
4"
4¼" DOUBLE METAL LATH & PLASTER SOUNDPROOF PART'N.
4¼"
4¼" PARTITION OF PLASTER ON GYPSUM TILE
4¼"
4½" PARTITION OF PLASTER ON HOLLOW CLAY TILE
4½"
5¼" PARTITION OF PLASTER ON GYPSUM TILE
5¼"
5½" PARTITION OF PLASTER ON HOLLOW CLAY TILE
5½"
5⅜" PARTITION OF PLASTER ON WOOD LATH ON 4" WOOD STUDS
5⅜"
5⅛" PARTITION OF PLASTER ON METAL LATH ON 4" WOOD STUDS
5⅛"
4" MASONRY PART'N. WITH WOOD LATH AND FURRING
7"
5½" PLASTERED DIRECT
8" MASONRY PART'N. WITH WOOD LATH AND FURRING
11" WITH LATH.
9½" PLASTERED DIRECT.
12" MASONRY PART'N. WITH WOOD LATH AND FURRING
15" WITH LATH.
13½" PLASTERED DIRECT.

Fig. 45—Graphical Comparison of Thickness, Commonly Used Partitions.



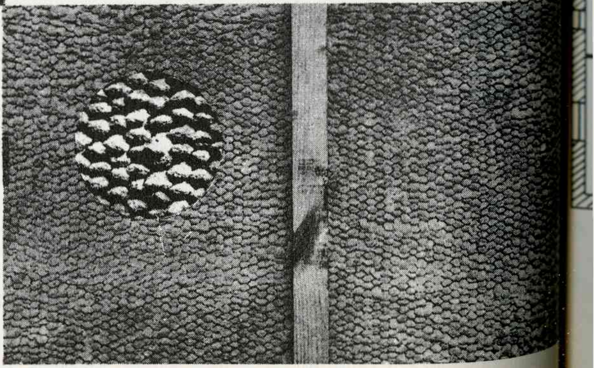
WHAT METAL LATH IS

To the right is a picture of a lather preparing to nail a sheet of Metal Lath to the partition. The sheet is 8 feet long and about 2 feet wide. This large "coverage" of each sheet knitting together the structural frame is part of the secret of strength of Metal Lath construction.



In the picture above, the Metal Lath is being applied over wood studs. Note the myriad of continuous, tough steel strands; it is these that strengthen the plaster against cracks.

The picture below shows the back of the lath after the plaster is applied. Note the practically continuous "keys" which, as soft plaster, passed through the meshes, and now have hardened to provide a permanent grip of plaster to the steel. This extra amount of plaster, together with the steel it embraces helps provide the necessary resistance to shocks which would cause plaster cracks on other plaster bases. It is, in fact, an important feature of superiority which distinguishes Metal Lath from all other bases.



Section No. III Part "B"

Space Saving

Building owners are asking their architects to specify materials which, while serviceable, fireproof and adequately soundproof, will occupy a minimum of valuable floor area and thus prevent the usually early obsolescence of their investment. Architects and engineers facing the urgent need for providing their clients with maximum rentable space at minimum construction cost will find in succeeding articles of this section, a complete analysis of space and equivalent rent savings effected through use of metal lath partitions which permit the ultimate in scientific layout and plan efficiency in all types of buildings.

In Toronto the apartment shown in Fig. 47 was erected in 1935. By the use of 2 inch solid metal lath and plaster partitions the owner saved 2 feet in length and one foot in width and retained the same size rooms. The building is 90 feet long, 47 feet wide and 50 feet high. The saving in cubic contents effected by the use of 2 inch partitions amounted to 9,200 cubic feet and this, figured at a minimum cost of 20 cents per cubic foot for this type of building, amounted to $1,840.00 or the total cost of the partitions.

This building contains approximately 4,600 square yards of metal lath of which 1,600 square yards is used on ceilings and 3,000 square yards in 2 inch solid metal lath and plaster partitions.

Thickness and Stability of Solid Metal Lath and Plaster Partitions Afford Greatest Space Saving Opportunities:

The exceptionally small amount of floor area occupied by solid metal lath partitions as compared with others is quickly discernible from the typical cross-section in Fig. 45, page 43. Of those shown the two inch solid metal lath and plaster and the

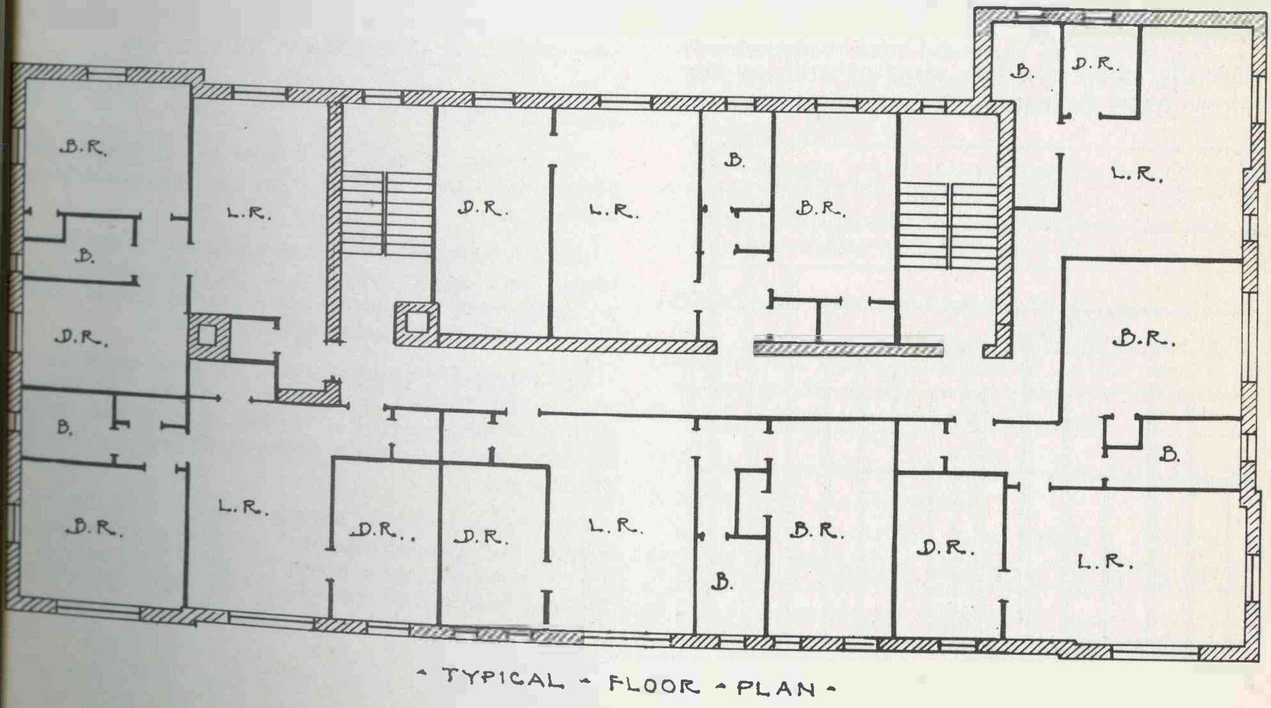


Fig. 47—Floor Plan of King-Dowling Apartments

three inch hollow lath and plaster partitions are the shallowest in common use and therefore afford the greatest opportunities for space saving.

There is also a partition of two inch blocks which finishes 3 inches thick. However, as an 8 ft. height limitation is set for this partition and as fire-resistive and stability regulations of practically all building codes stipulate 3 inches as the minimum unplastered thickness for all block partitions, 2-inch block partitions are not illustrated since ceiling heights exceed 8 feet in the types of occupancy to be discussed.

Factor of Stability Favours Metal Lath Partitions:

Limiting heights of partitions based on stability and required thicknesses of block and tile partitions for various heights are shown in Fig. 49. Also shown are heights for metal lath partitions as sanctioned by building codes generally. The 2-inch metal lath partition because of its two-way reinforcement is permitted for heights as great as masonry partitions of considerably greater thickness. Ninety-five per cent of all partitions do not exceed ten feet in height. The 2-inch partition of plaster and metal lath is suitable for partitions of this height and meets all requirements of strength and stability.

Practical Ways to Utilize Space Saving of 2-Inch Partitions:

Basically, there are two ways of utilizing the space saving advantages of shallow partitions:

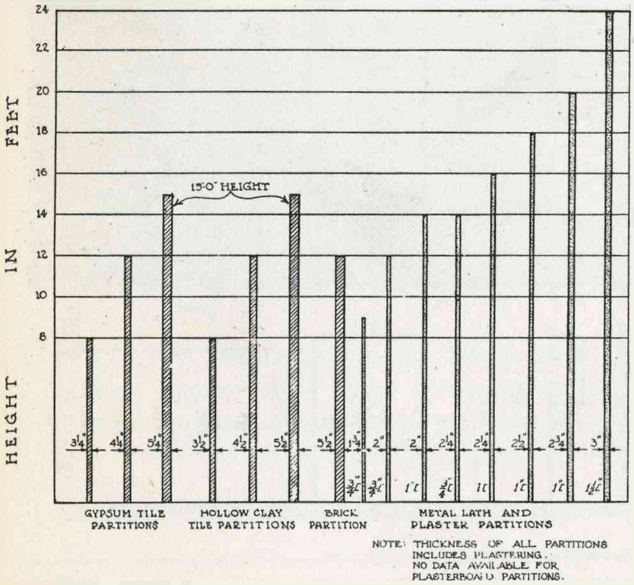


Fig. 49—Permissible Heights of Masonry and of Metal Lath Partitions of Various Thicknesses.

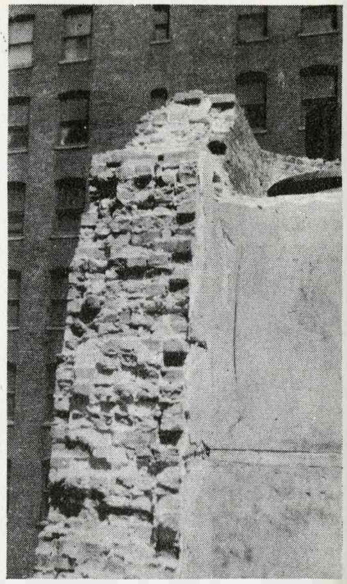


Fig. 50—Thick Walls Important Cause of Obsolesc and Razing of Old Tacoma Building, Chicago, 192

(a) If the size of the building is fixed, empl 2-inch partitions to increase the net usable unencumbered floor space.

(b) If size of building is not fixed, employ 2-in partitions to decrease its size and hence the co struction volume, and thus reduce costs, althou providing same net floor area as originally.

These advantages may be described in be detail as follows:

(1) Saving of several inches in thickness f each lineal foot of partition permits enlarg room areas.

(2) By redesign or rearrangement of the flo layout this space saving can be concentrated produce more rooms or more "liveableness" a convenience than in the original layout.

(3) Income of buildings with the same gross ar within the exterior walls will be greater in tho with increased space due to shallow partitions tha in those with rentable space occupied by thi partitions.

(4) Construction costs may be reduced by taining the original intended net usable floor are exclusive of space occupied by partitions and r ducing gross cubical contents of the building by of the shallow partitions in place of thick, wastel partitions.

In both (3) and (4) the advantages of the shallo partitions are vitally important to the investor w is thereby enabled to add 5% to 12% to net inco

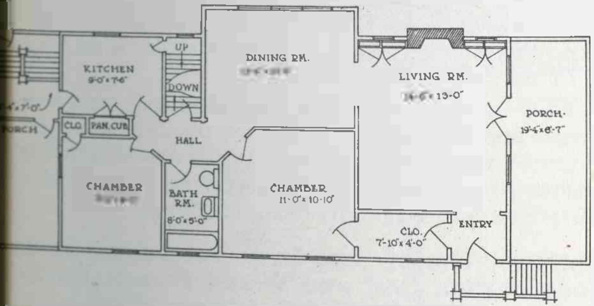
pace Saving Principles Apply to All uildings Regardless of Size:

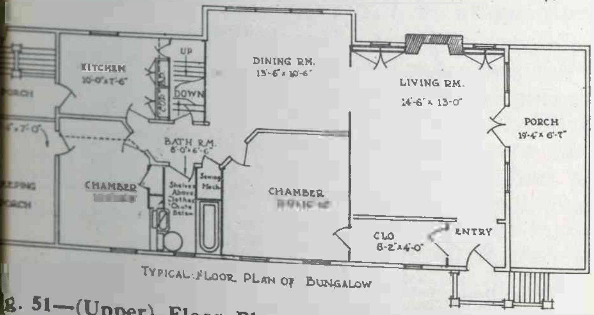
Although at first thought no connection between oblems of bungalow and office building design is ident, careful study reveals that the basic prin- iples of space saving, apply regardless of size of ructure. Accordingly, it has been deemed advis- le in developing this subject to start with the allest building unit and proceed by degrees to rger ones. For this reason the discussion will art with a small bungalow and in turn take up pical 2-story residences, 3 flat buildings, apart- ent (tenement) houses, hotels and office buildings.

pace Saving of Distinct Advantage Even in Five-Room Bungalow:

In the average residence built where ground lues are moderate, condition (2) described in the evious article, prevails, but marked improve- ents in the "liveableness" are easily possible as ll be noted by reference to the typical five room ngalow floor plan shown in Fig. 51. Partitions e ordinary 2 x 4s plastered both sides and finishing out 5½ inches in thickness.

By redesigning to make use of shallow partitions e layout of Fig. 52 was obtained. Assuming the p of the plan to be north, the east and west rtitions are retained as 2 x 4 bearing partitions carry the ceiling joists above, while the north d south partitions, excepting for one wall of the throom in which soil pipes must be enclosed, have been changed to 2-inch solid partitions as shown by the single lines.





g. 51—(Upper) Floor Plan of Five-Room Bungalow, Wood Stud Partitions Throughout.

52—(Lower) Revised Floor Plan Same Bungalow, Non-Bearing Partitions Solid Metal Lath.

While each of the rooms is the equivalent in area to the original and some are even larger, note the following improvements in the revised layout:

(A) A twelve inch total saving on the walls of the dining room and stairway corresponds to a space saving 12 inches deep running the entire length of the east wall of the kitchen. Accordingly, the cupboards of Fig. 51 built into a recess on the south wall of the kitchen are shifted to the east wall of the kitchen where they are somewhat enlarged and more accessible.

(B) The 4 inches gained on each of the two walls of the front bedroom provide an additional eight inches for the bathroom. Four inches more would permit a much better arrangement for this room and this much space is accordingly borrowed from the west bedroom, making the bathroom 8′-0″ by 6′-6″.

(C) This space has been divided as in Fig. 52 to provide:

(a) Larger closet for west bedroom in place of the small one shown in Fig. 51.

(b) A new linen closet and clothes chute in the bathroom.

(c) A new closet for sewing machine storage, etc.

(D) Changes effected in (A), (B) and (C) have cleared the entire north wall of the rear bedroom, and by thus making the room 2 feet longer and 4 inches narrower have increased its floor space over 17 per cent. This is admittedly a great deal in a small bedroom as it permits arranging the furniture much more effectively.

(E) Changes (A) to (D) permit placing a door in the west wall of the rear bedroom to open on to an accessible and private sleeping porch in the rear, a facility impossible with the space in Fig. 51.

Advantages Obtained at Trifling Expense:

The foregoing represents ready possibilities in space saving which will greatly better design of even a small bungalow and the changes are accomplished at little or no increase in cost.

Where Rearrangement is Not Feasible Larger Rooms May Be Obtained:

Structural conditions in a building sometimes prevent advantageous redesign or rearrangement of rooms to permit concentrating the space saving of two inch partitions into certain areas. In such instances the saving in space may be used to increase the size of one or more of the rooms or to decrease the size of the building.

This condition obtains in the nine room house, the second floor plan of which is shown in Fig. 53.

All partitions are 2 by 4 wood studs. Fig. 54 shows the same plan with the non-bearing partitions changed to 2-inch metal lath and plaster. Practically every room has thereby been made 4 inches larger in at least one dimension. A wall moved back four inches its entire length makes considerable difference in clearance for doors swinging close to furniture, and is frequently sufficient to permit the inclusion of necessary pieces of furniture for which space could otherwise not be found.

Space Saving Permits a Smaller Structure and Reduces Cost of Construction:

In the above building thick partitions waste space aggregating 32 square feet or 259.04 cubic feet, on one floor, and for the entire house, approximately 500 cubic feet. This amount of construction can be saved by reducing the size of the building through use of non-bearing partitions two inches thick. The walls of the building would be, in effect, merely squeezed together; the size of the rooms would be unchanged. Cost of excavating, foundations, floors, roof, heating and similar items are thereby reduced.

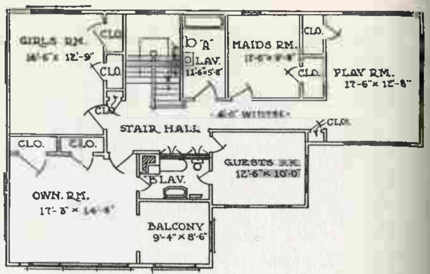
Saving Space in Three Storey Flat Building Means Increased Convenience and Income:

Investors and owners find that 2-inch partitions used in small non-fireproof buildings such as apartment and flat buildings bring added convenience and considerable financial advantage. In Fig. 55, Page 50, is illustrated a typical floor plan of a six room apartment in a modern three flat building. All partitions both bearing and non-bearing are 2 x 4 wood studs.

In Fig. 56, Page 50, the plan has been redesigned, 2-inch solid partitions being employed wherever feasible for non-bearing purposes; 2 x 4 partitions remain for bearing purposes. Note the distinct improvements in convenience. The 12 inches east and west saved in the north part of the house enlarge the kitchen pantry at (1); they might equally well have been used to enlarge the dining room. 14 inches gained opposite the kitchen pantry provides a new broom closet at (2) adjoining the pantry case. This broom closet supplants the original one at the rear which by the aid of 2 inch partitions has been transformed into an additional lavatory (3), a much needed facility in a three-bedroom apartment with only one bathroom.

New Concealed Bed Closet Made Possible by Two-inch Partitions Increases Rentability:

In the south half of the apartment 2 inch partitions save 18 inches for a distance half the width of the house and this space, together with 2 inches taken from the width of the middle bedroom, forms a concealed bed closet (4), a convenience entirely new in this planning, so that the floor can be cleared by rolling or swinging the bed into the closet. With this added facility the room may be used as a li bedroom and with the rear bedroom converted a kitchen, and with the new lavatory, a kitch apartment can be partitioned off and rented arately, a highly desirable income feature to owner. Or the room may be used as a chil play and bedroom, a den or study in whi unencumbered floor is wanted during the Note that in every case the closet space is as l as in the original layout.



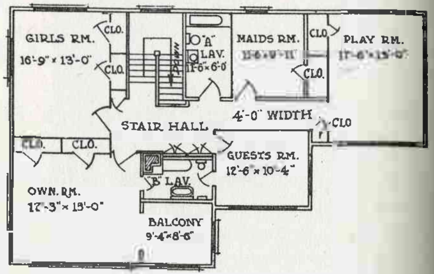


Fig. 53—(Upper) Two-story Residence, Wood Stud titions Throughout.

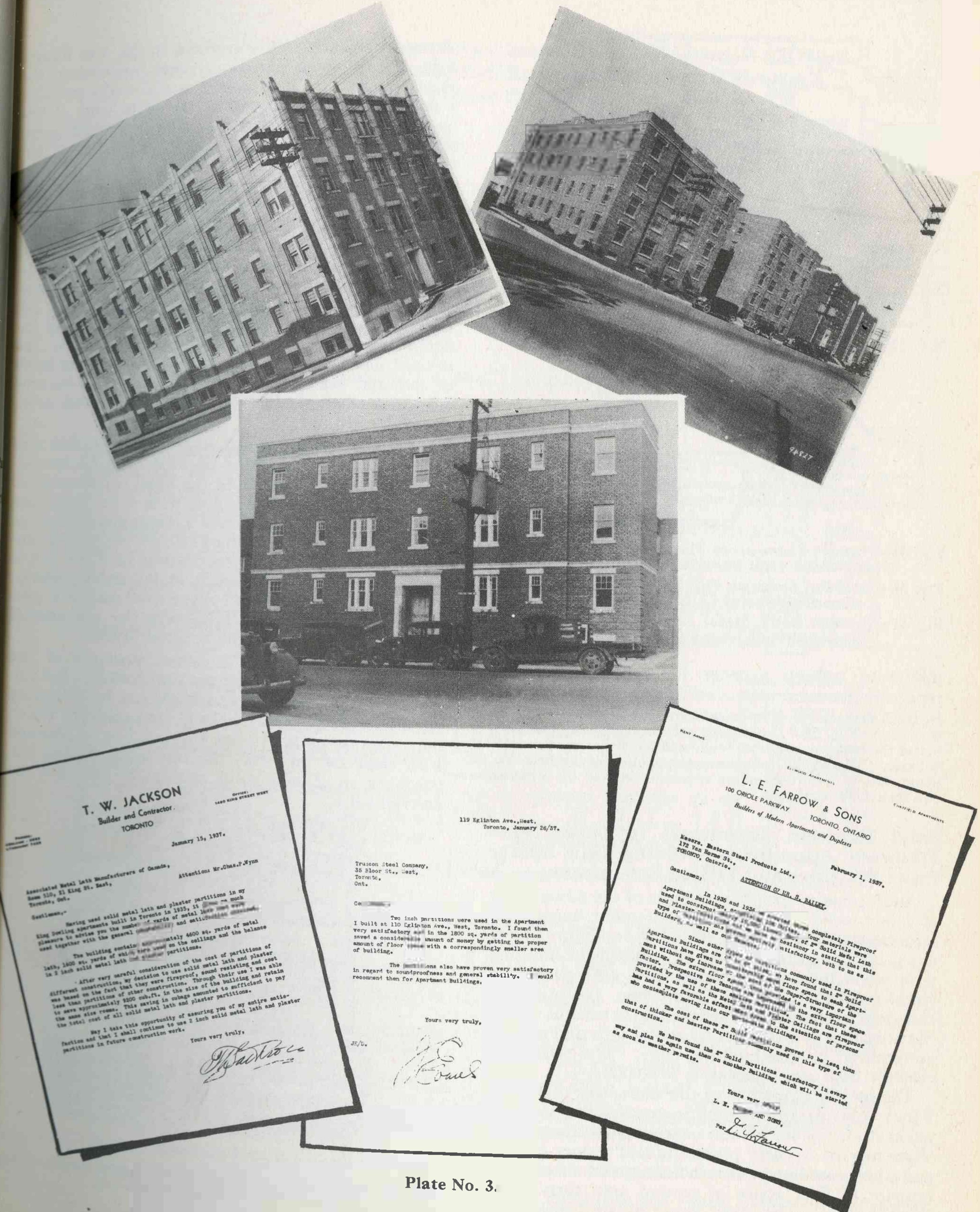
Fig. 54—(Lower) Same Residence—Non-Bearing tions, Solid Metal Lath and Plaster.

Thus many additional housekeeping conv ences, appreciated by tenant or owner, have obtained merely by utilizing 2 inch metal lath plaster partitions in places where thick wood s partitions had originally been specified.

Optional Use of Two-Inch Partitions Sa Construction Cost and Would Permit En Building to be Protected Against Fire.

Construction cost savings which may be obtai in this particular building are shown in another drawing of the plan, see Fig. 57, Page 50. 2-i partitions used where 2 x 4 inch non-bearing pa tions were called for in the original design per the building to be shortened up, the area sa being shown by shaded lines. The saving of square feet in the building is approximately per cent of the total occupied floor area.

The total additional cost of using plaster metal lath in place of ordinary lath for all ceili and for bearing partitions would be more t sufficient to provide at least one-hour fire protect for all parts of the building and to have the ma advantages of better plastering on metal lath w



T. W. JACKSON
Builder and Contractor.
TORONTO

OFFICE:
1480 KING STREET WEST

January 15, 1937.

Associated Metal Lath Manufacturers of Canada,
Room 510, 21 King St. East,
Toronto, Ont.

Attention: Mr.Chas.P.Wynn

Gentlemen,-

Having used solid metal lath and plaster partitions in my King Dowling apartments built in Toronto in 1935, it [redacted] much pleasure to advise you the number [redacted] yards of metal l[redacted] used together with the general [redacted] and sati[redacted]

The building contain[redacted]tely 4600 sq. yards of metal lath, 1400 sq. yards of whi[redacted] on the ceilings and the balance in 2 inch solid metal lath [redacted] partitions.

After very careful consideration of the cost of partitions of different construction, my decision to use solid metal lath and plaster was based on the fact that they were fireproof, sound resisting and cost less than partitions of other construction. Through their use I was able to save approximately 9200 cub.ft. in the size of the building and retain the same size rooms. This saving in cubage amounted to sufficient to pay the total cost of all solid metal lath and plaster partitions.

May I take this opportunity of assuring you of my entire satisfaction and that I shall continue to use 2 inch solid metal lath and plaster partitions in future construction work.

Yours very truly,

---

119 Eglinton Ave.,West.
Toronto, January 26/37.

Truscon Steel Company,
35 Bloor St., West,
Toronto,
Ont.

Ge[redacted]

Two inch partitions were used in the Apartment I built at 110 Eglinton Ave., West, Toronto. I found them very satisfactory [redacted] in the 1800 sq. yards of partition saved a conside[redacted] amount of money by getting the proper amount of floor [redacted] with a correspondingly smaller area of building.

The [redacted]ons also have proven very satisfactory in regard to soundproofness and general stability. [redacted] would recommend them for Apartment Buildings.

Yours very truly,

JE/D.

KENT ARMS

ELMWOOD APARTMENTS

L. E. FARROW & SONS
100 ORIOLE PARKWAY TORONTO, ONTARIO
Builders of Modern Apartments and Duplexes

CHATFIELD APARTMENTS

Messrs. Eastern Steel Products Ltd.,
172 Van Horne St.,
TORONTO, Ontario.

February 1, 1937.

Gentlemen;

ATTENTION OF MR. S. BAILEY.

In 1935 and 1936 [redacted] completely Fireproof Apartment Buildings, [redacted]. Your materials were used to construct[redacted] of 2" Solid Metal Lath and Plaster [redacted] hesitancy in stating that this type of [redacted] satisfactory, both to us as Builders, as well as o[redacted]

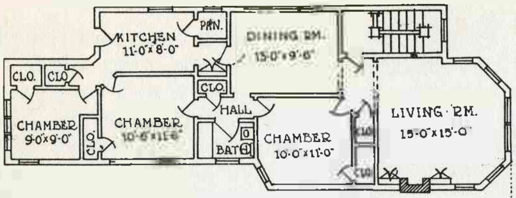
Since other [redacted] commonly used in Fireproof Apartment Buildings are [redacted] we have found that 2" Solid Partitions have given us [redacted] floor space to each Apartment without any increase [redacted] Super-Structure of the Building. The extra floor s[redacted]ded is a very important factor. Prospective new Tena[redacted] the extra floor space provided by the use of these [redacted]. The fact that these Partitions, as well as the Meta[redacted] Plaster Ceilings are fireproof has had a very favorable effect [redacted] to the attention of persons who contemplate moving into our [redacted] Buildings.

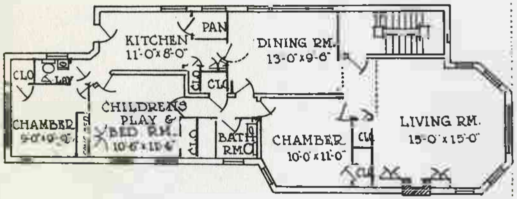
The cost of these 2" S[redacted]titions proved to be less than that of thicker and heavier Partiti[redacted] commonly used on this type of construction.

We have found the 2" Solid Partitions satisfactory in every way and plan to again use them on another Building, which will be started as soon as weather permits.

Yours very [redacted]
L. E. [redacted] AND SONS,
Per L. E. Farrow

Plate No. 3.





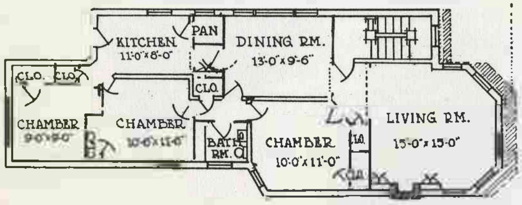


Fig. 55—(Upper) Three-story Flat or Apartment Building—Wood Stud Partitions Throughout.

Fig. 56—(Middle) Same as Fig. 55, Non-Bearing Partitions Solid Metal Lath and Plaster.

Fig. 57—(Lower) Solid Metal Lath Partitions Reduce Construction Volume (shaded area).

minimum upkeep expense for redecoration and repair of plaster cracks.

Note: A perspective of the apartment building just discussed is shown in Fig. 58. The portion extending sideways entirely across the building and from foundation to top of parapet wall between "A" and "B" represents the amount of construction eliminated with corresponding reduction in cost by utilizing two inch solid partitions.

Solid Partition Advantages in Large Non-Fireproof Apartments—Adding One Apartment Per Floor and 12% to Net Income:

An impressive graphic example of the advantages of 2-inch solid partitions in apartment house construction is shown in Fig. 59. The top figure shows a typical floor plan of a 3-storey apartment building with wood lathed and plastered 2 x 4″ partitions (total finished thickness 5½ inches), excepting for corridors, stairways and between apartments, where the studding is protected by metal lath and plaster as required by the building code. The estimated cost for land and building is $100,000.

The middle figure shows the same floor plan with 2-inch solid partitions used instead of the 5½-inch wood stud type for all non-bearing partitions except those needed to carry plumbing and service piping; and the cross-lined area indicates the substantial amount of floor space or ground area thus saved on each floor. The lower figure shows how the use of the total floor area consumed in the top fi with 2-inch solid partitions, and relocating chimney and the closet space, would make possi a rearrangement of space at the right end of building to provide for one complete additio apartment of about the same average size as others, on each floor.

With this revised plan of construction th would be (for a 3 storey building) an increased of about $1,200 for additional plumbing and tures, and this, a legitimate expense because of 3 additional apartments, would be the only ad tional cost necessary to secure the increased inco there being no appreciable difference in cost tween the partition constructions. The gross come from the building built according to revised plan would be $17,460 (figured on the ba of average prevailing rentals), while the inco from the original plan, on the same ground a would be $16,560.

After deducting interest, taxes, depreciation maintenance on the basis of 10% of total in ment, the net income from the total investment $101,200 for land and building with solid partiti would be $7,340 according to the revised plan, compared to $6,560 on the $100,000 original str ture. This is a gain in net income of $780. I sufficient to pay for the additional plumbing equ ment, etc., in less than 2 years and makes a p manent annual gain of 12% over the net ann income obtained from the original layout.

The preceding is an excellent example of great field open to architects and builders for i proving their service to their clients by adapt the 2-inch metal lath partitions to buildings wh they plan or build. Unless the building is plan with their use in view, the full space saving vantages of 2-inch solid partitions will not derived.

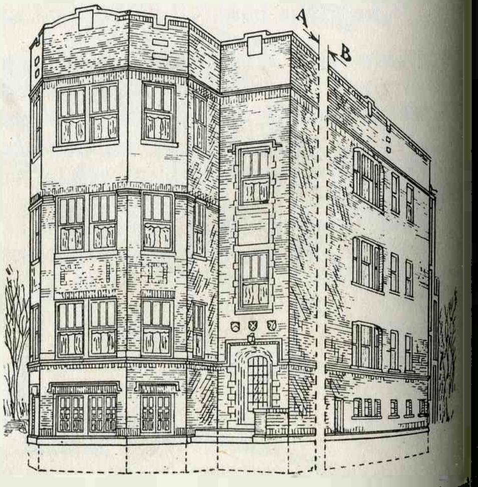


Fig. 58—Perspective of Building of Figure 55 Show Construction Volume Saving

Comparison of Annual Income of Apartment Building Having Wood Stud Partitions with Income of Same Building Constructed with Two-Inch Solid Plaster Partitions

Total Rentals, Plan as in Fig. 59-A. Per Floor Per Month are as follows:		For Buildings (3 stories high)
Apartments 1 and 2 @ $45.....	$90	$270
Apartments 3, 4, 5, 6, 7, 8, 9, 10 @ $40.....................	320	960
Apartment 11 @ $50.........	50	150
	$460	$1380
(1) Annual gross income building with Wood Stud Partitions.	$5520	$16560

Total Rentals Per Floor Per Month Revised Plan Fig. 59-C.		
Apartments 1 and 2 @ $45....	$ 90	$ 270
Apartments 3, 4, 5, 6, 7, 8, 9, 10 @ $40....................	320	960
Apartments 11, 12 @ $37.50...	75	225
	$485	$1455
(2) Annual gross income building with 2″ Solid Plaster Partitions....................	$5820	$17460

Difference in Favour of Building Fig. 59-C (annually)...................$900

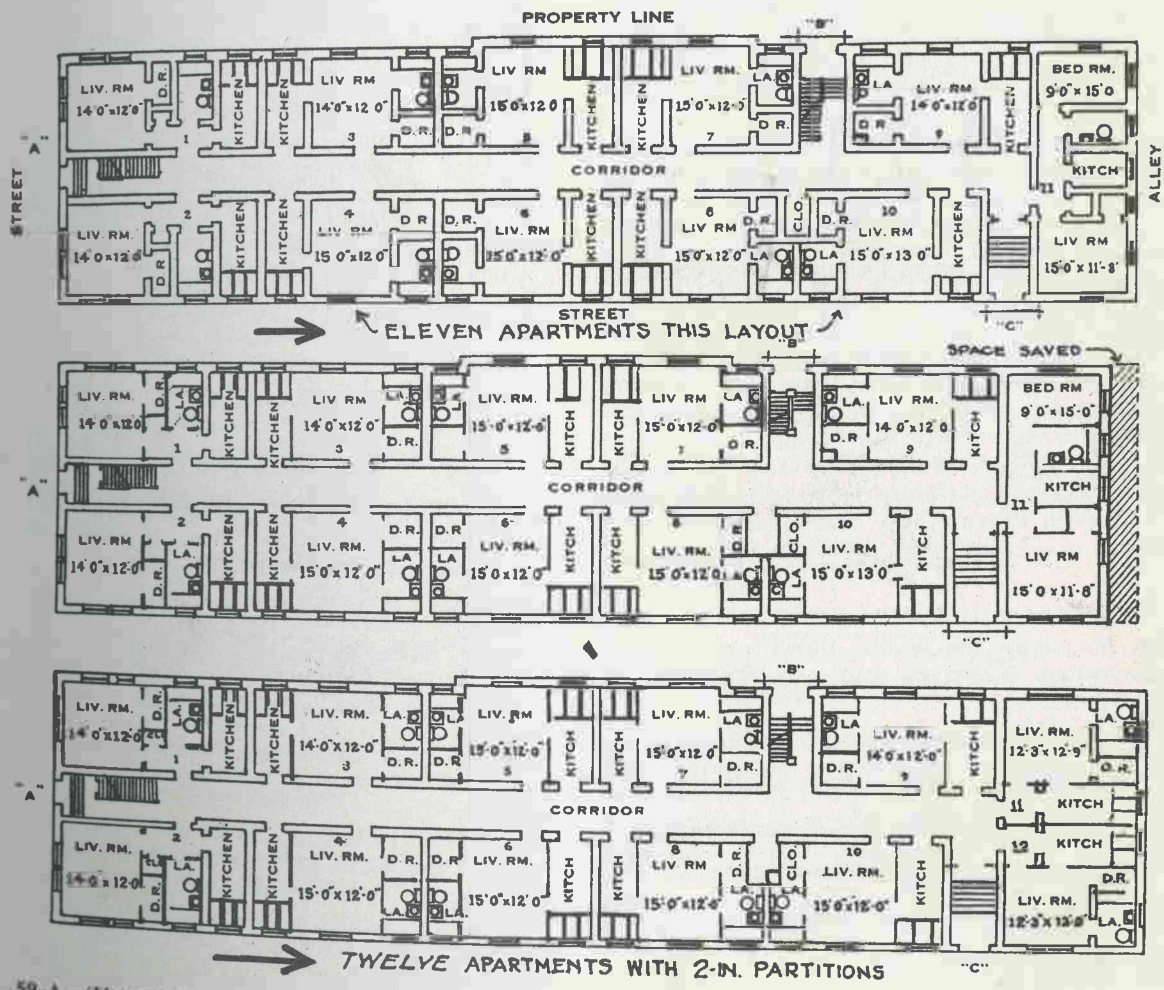


Fig. 59-A—(Upper) Apartment Building Plan—Wood Stud Partitions Throughout—Eleven Apartments Per Floor
B—(Middle) Same as "A" but Non-Bearing Partitions Solid Metal Lath and Plaster showing in shaded area, aggregate Space Saving at right.
C—(Lower) Redesign of Plan "A" Utilizing Space Saving of Solid Metal Lath and Plaster to provide an Additional Apartment Per Floor.

Antiquated Building Codes Requiring Masonry Walls Between All Apartments in Non-fireproof Buildings Saddle Owners and Occupants with Needless Expense:

The important effect of building codes on construction of non-fireproof apartments merits a brief discussion here.

Originally building codes required self-sustaining bearing or non-bearing walls between each and every apartment in non-fireproof buildings three stories and basement in height. This provision was formulated in the days when single apartments were large and consisted of from seven to ten rooms each and an area of several thousand square feet, and before an adequate means of protecting the wood structural members had been devised. Such requirements are no longer necessary: apartment units frequently consist of only one and one-half to two rooms; wood joisted floors and partitions when protected by metal lath and plaster were granted a one-hour rating by the Underwriters' Laboratories in 1922 and have been given full recognition by building code regulations throughout the country.

Modern codes now require masonry division walls in non-fireproof apartments only so that not more than four adjoining apartments or not to exceed four thousand square feet are included between such walls. Within these areas any type of partition is permissible but metal lath is required on all wood joisted ceilings and on dividing and corridor partitions of combustible construction to prevent the vertical and horizontal spread of fire. When so built the building is safer than with the combination of masonry walls around each apartment and unprotected ceilings throughout.

The building code of the city of Toronto permits the use of 2-inch solid metal lath and plaster partitions between suites of any area and for corridor partitions of all apartment buildings.

Thick Masonry Walls and Partitions Add to Construction Expense and are Wasteful of Floor Space:

Fig. 59, Page 51, is illustrative of an apartment building erected in a city with a modernized code (partitions between apartments and ceilings protected with metal lath and plaster). Had masonry been required for each of the dividing partitions and corridors it would require 36 inches more space than the wood studs and metal lath, and counting space lost in corridors only 10 apartments would have been possible instead of 11.

The modern code permitting construction as in Fig. 59-C, Page 51, with metal lath protection both sides for dividing bearing partitions and utilizing 2-inch solid partitions for non-bearing purposes, provides 12 apartments within the same wall area, 2 more than possible under an antiquated code.

The total space saved as compared with
and wood lathed partitions is 658 square
at $3.75 per square foot amounts to $2
Adding the $2048.00 difference between
twelve-inch masonry partitions and that
tected wood stud partitions brings the total
$4515.50.

This saving of over $4500.00 in a $100,000
ment would be almost sufficient to pay the
tect's fee and is about half the total cost
average city lot for an apartment building
size.

Modernized Code, Solid Partitions In Building Income — Reduce Const Costs:

Adding Dinette to Kitchenette Apartment Building Income $1100:

The comparative space occupied by par
built as required by old and by modern
shown in Fig. 60 for a typical 3-apartmen
Applied to the kitchenette apartment plan
61, Page 53, it makes possible the addition
dinette to apartments 2 and 3 on each
shown shaded. Each dinette increases the
$12.50 per month, making $75.00 a month
building or $900.00 per year. The 2-inch
metal lath partitions save an additional
under the cost of 13-inch brick. Ten per
this annually for interest, taxes, etc., is
which added to the $900.00 income increase
a net gain of $1111.00 per annum for the
partitions.

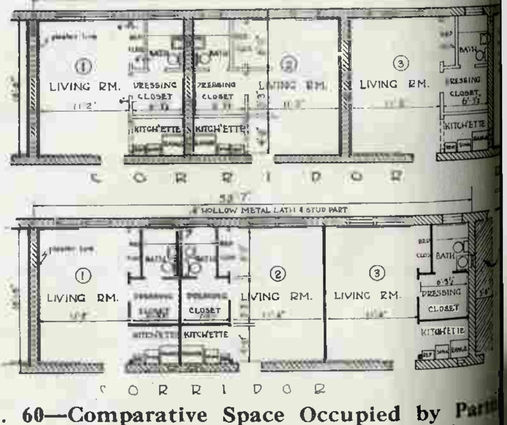


Fig. 60—Comparative Space Occupied by Part
Old Code (above); Modern Code (below);
Two-inch Partitions

Two-Inch Lath Partitions in Modernized Save 7 Per Cent of Construction Cost:

Instead of increasing the rentable area the
can elect to deduct the space saved as shown
in Fig. 60, and build a smaller building. In
apartment building of Fig. 61, Page 53, this
sents a saving in construction costs of $4780
with the $2110.00 saved by eliminating
masonry walls makes a total saving of $6890.
nearly 7 per cent of the actual costs which
$100,000.00.

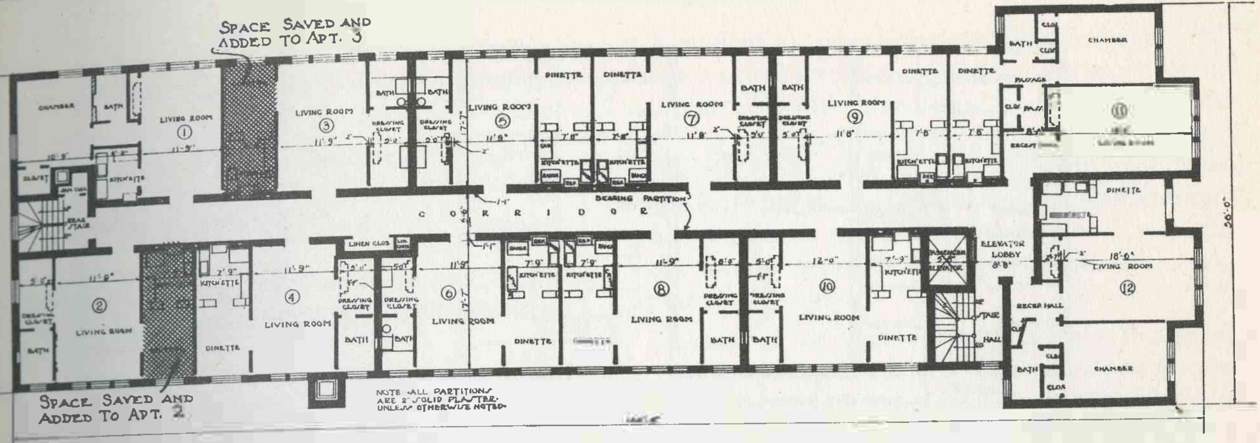


Fig. 61—Additional Income Producing Area in Apartment Building by Employment of 2-inch Partitions made possible by Modernized Building Code

Space Saving Important Factor in Financial Success of Fireproof Apartments and Hotels:

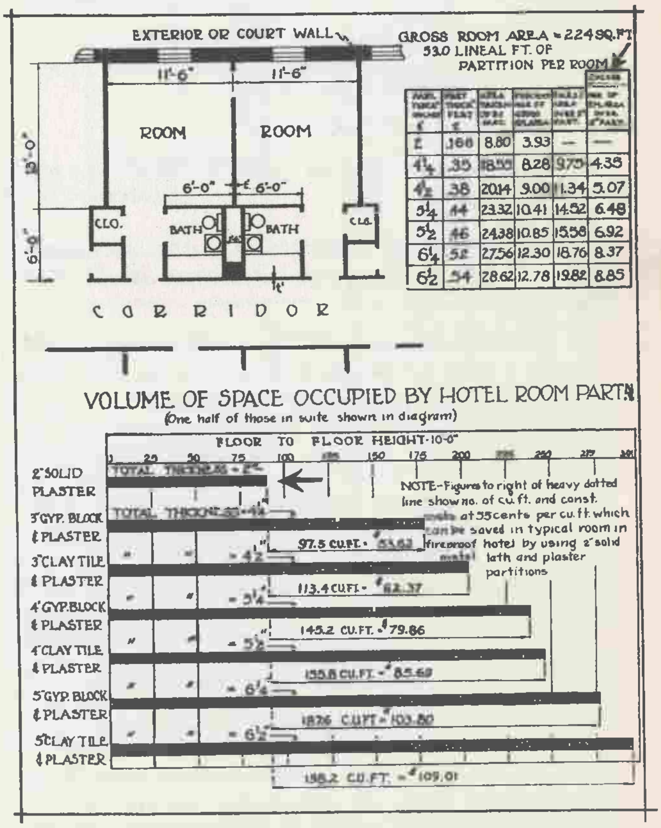
With their larger floor areas and their greater number of rooms and partitions per floor, fireproof apartments and hotels offer relatively more frequent opportunities for space saving than do the smaller structures heretofore described. The greater number of partitions offsets the lesser thickness saved on each partition, the comparison in fireproof construction being between 2-inch and 4¼, 4½, 5½ or 6-inch partitions rather than between 2-inch and 6, 9 and 15-inch partitions as in non-fireproof construction.

The space saved by 2-inch solid metal lath and plaster partitions in comparison with other types finishing 4¼ inches and upward in thickness is in fact an important income-producing asset which in many instances swings the scales to favour the financial success of large apartment or hotel projects competing with others for tenants.

Masonry Partitions in Typical Hotel Room Occupy Up to Eleven Per Cent of Actual Floor Area:

The wastefulness of thick partitions can readily be verified by checking over the table in Fig. 62 in which the actual areas and percentage of the total floor area occupied by partitions of various thicknesses are given for a typical hotel-room layout. The figures are for one room, that is, only one-half of the suite of rooms shown. Of the available floor area 4½-inch partitions occupy 9 per cent and 5½-inch partitions 10.85 per cent as compared with less than 4 per cent for 2-inch partitions. In the last column are given the percentages in excess of that occupied by 2-inch metal lath partitions. This shows that partitions 4½ inches thick occupy 5 per cent more space than 2-inch partitions, and those 5½ inches thick, 6.92 per cent more. This is useful area which by redesign or rearrangement can readily be converted into income producing space.

Another measure of the wastefulness of thick partitions is the excess cost of the larger construction volume required for them as compared with 2-inch partitions. This is shown graphically at the bottom of Fig. 62. At 55 cents per cu. ft., an assumed average cost for fireproof hotel construction, the excess construction volume for a single hotel room with 4½-inch partitions costs $62.37 more than for 2-inch partitions, and for 5½-inch partitions, $85.69 more. In a 500 room hotel this extra construction volume runs into thousands of dollars.



GROSS ROOM AREA = 224 SQ.FT.
53.0 LINEAL FT. OF PARTITION PER ROOM

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	.166	8.80	3.93	—	—
4¼	.35	18.55	8.28	9.75	4.35
4½	.38	20.14	9.00	11.34	5.07
5¼	.44	23.32	10.41	14.52	6.48
5½	.46	24.38	10.85	15.58	6.92
6¼	.52	27.56	12.30	18.76	8.37
6½	.54	28.62	12.78	19.82	8.85

NOTE—Figures to right of heavy dotted line show no. of cu. ft. and const. costs at 55 cents per cu. ft. which can be saved in typical room in fireproof hotel by using 2" solid metal lath and plaster partitions

Fig. 62—Floor Area and Space Volumes Occupied by Hotel Partitions, According to Thickness.

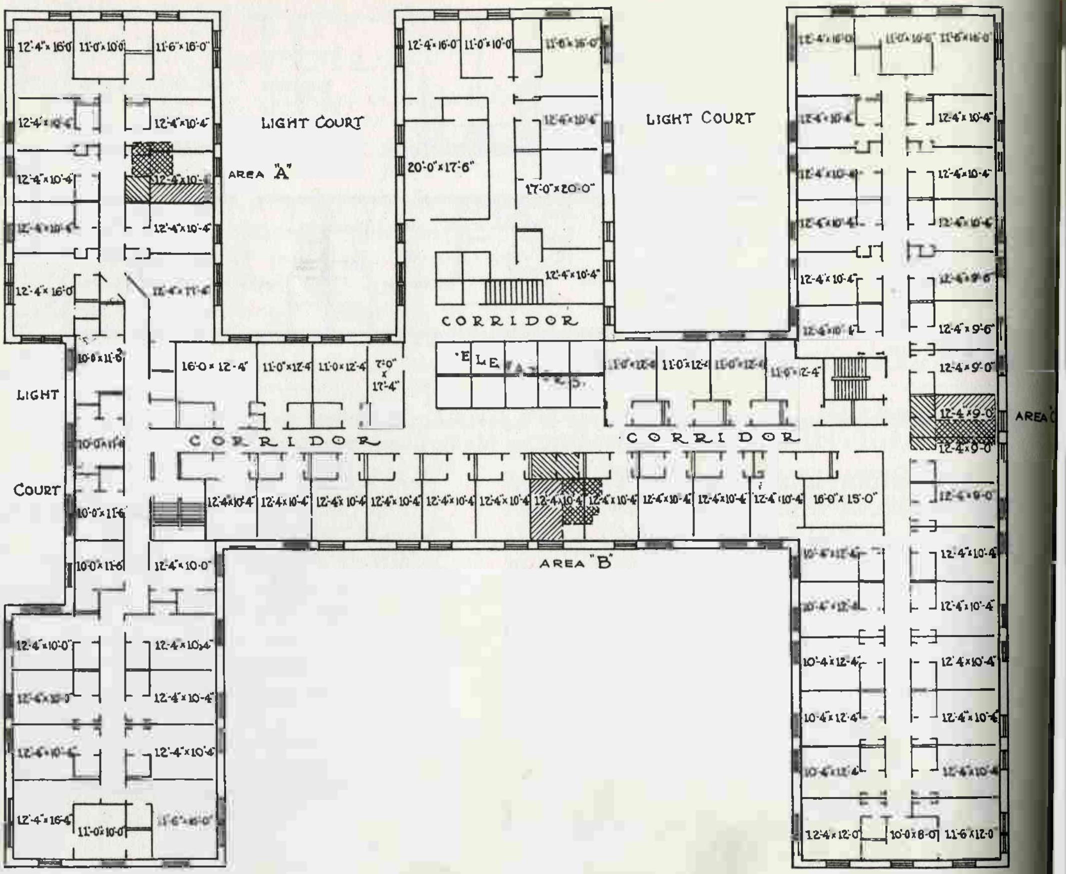


Fig. 63—Typical Hotel Floor Plan. Two-inch Metal Lath Partitions Save Equivalent of Three Rooms per Floor.

Use of Two-Inch Partitions Adds 25 Rooms and $40,000 to Potential Income of Modern Hotel:

A striking example of the space saving advantages of 2-inch partitions is shown in the floor plan, Fig. 63. If masonry partitions finishing respectively 4½ and 5½ inches thick had been used for room separations and for corridors, the areas A, B and C, cross lined and which total over 500 square feet per floor, would have been lost. These represent the cumulative space savings in the partitions between rooms, around bathrooms, and closets and in the corridors for the left wing, central portion, and right wing of the building respectively. This total is sufficient to make three full-sized rooms whose equivalent would have had to be deducted pro rata from each guest room with consequent lesser desirability.

The structure has eight and one-half floors of rooms. Two-inch solid partitions thus provide the management with 25 additional rooms per day which at the usual rental of $4.50 brings in a potential increase in daily income of $112.50, or over $40,000 per year—practically all "velvet". an advantage, in periods of business depre places the management in much better posit compete with other hotels, and at all time substantial factor in taking care of fixed char interest, taxes, etc., on the property.

Cumulative Space Saving Advantages Satisfactorily Realized When Planned D Original Layout:

In demonstrating the additional space ob in a layout such as Fig. 63, no attempt ha made to show that an additional room mig obtained at the end of a hall or corridor, by p the accumulated space saving at such a sp point. However, on such a floor portions m assigned to corridors, stairwells, elevator service rooms, pipe shafts, etc. Althoug must conform to building code and conv requirements, the architect is given consid leeway in determining their location. K that 2-inch partitions will be used, the ar can so manoeuver the location of shafts, co uest rooms, etc., that the cumulative space saving f 2¼ to 4 inches on each partition can be allocated the best advantage and turned into revenue roducing rooms. Only in this way can the full pace saving advantages of 2-inch partitions be ealized.

onstruction Volume Cost of Hotel Decreased 30,000 With Identical Guest Accommodaions Using Two-Inch Partitions:

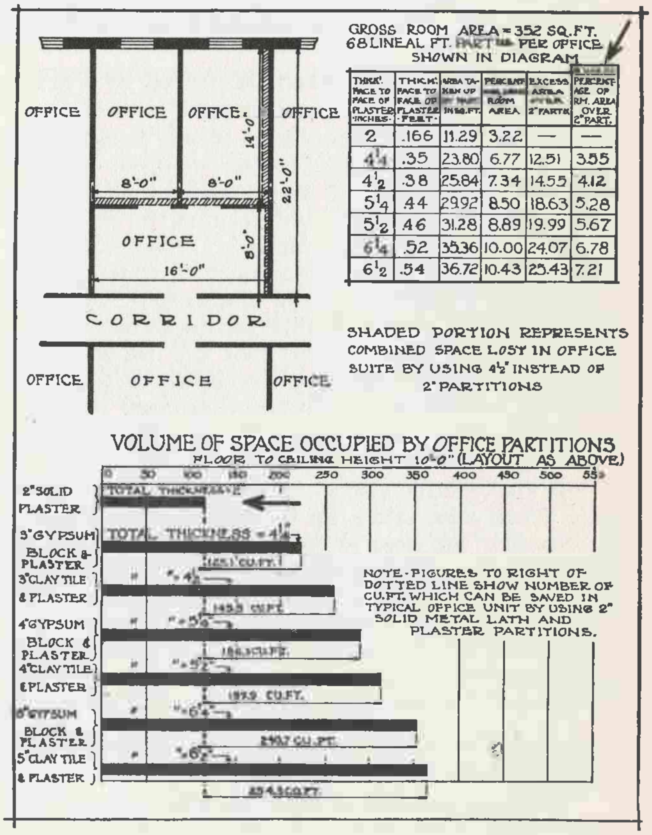
The application of the construction volume diarams at the bottom of Fig. 62, Page 53, to the lan shown in Fig. 63, Page 54, likewise proves lluminating. To provide the same number of ooms using 3-inch masonry (finishing 4½ inches hick) as were obtained with 2-inch solid partitions, ould entail an increase in size of building which, t 55 cents per cubic foot (an average for this type f construction), would cost $31,000.00. The coresponding increase in construction volume with inch masonry partitions used, would amount to ver $53,000.00.

Sums of this proportion have focused the attenon of architects who specialize in hotel planning, s well as hotel owners and operating companies, n the desirability of using 2-inch solid partitions avoid the increases in investment and in fixed nnual charges incurred when 4 and 5-inch partion thicknesses are employed. The result is that housands of commercial and apartment hotels ave been built with 2-inch metal lath partitions.

ffice Building Tenants Demand Space Savng Partitions for Efficient Layout:

Although it is true that office space is frequently old on the bases of location, service, natural light, c., still more offices can be located almost anyhere within a business district of fairly large area nd serve the client equally well. Rent is a subantial item for most tenants and therefore cost er square foot of usable space bulk largest in etermining their choice. Again it is true that the wner rents space from centre to centre of partitions nd from corridor face to glass surface in exterior alls, and seems therefore to have little to gain by lopting the use of thinner partitions, the area asis remaining the same. But if he can assure a nant of 5 per cent more useful area for the same ntal, and this without cost to himself (the owner), it is evident in times when buildings are many and tenants are few that the owner is in a much better position and will have fewer vacancies than the one who uses partitions 4¼ inches thick or more. When the time comes, as it undoubtedly will, when space is rented on the basis of unencumbered useful area, the owner can pocket from 4 to 7 per cent more income than his competitor with his thick-partitioned building.

In fact, in no type of buildings are the space saving advantages of 2-inch solid partitions so outstanding as in office buildings with their myriads of division walls and partitions. On each and every one of these, several inches in thickness may be saved. For every five lineal feet the 2-inch partition saves one square foot of useful area as compared to a 4½-inch thick partition. And every square foot of space costs at present an average of $2.60 per square foot per year.


GROSS ROOM AREA = 352 SQ.FT.
68 LINEAL FT. PART'N PER OFFICE
SHOWN IN DIAGRAM
OFFICE
OFFICE
OFFICE
OFFICE
14'-0"
22'-0"
8'-0"
8'-0"
OFFICE
8'-0"
16'-0"
CORRIDOR
OFFICE
OFFICE
OFFICE
SHADED PORTION REPRESENTS COMBINED SPACE LOST IN OFFICE SUITE BY USING 4½" INSTEAD OF 2" PARTITIONS
VOLUME OF SPACE OCCUPIED BY OFFICE PARTITIONS
FLOOR TO CEILING HEIGHT 10'-0" (LAYOUT AS ABOVE)
0
50
100
150
200
250
300
350
400
450
500
550
2" SOLID PLASTER
TOTAL THICKNESS
3" GYPSUM BLOCK & PLASTER
TOTAL THICKNESS = 4¼"
125.1 CU.FT.
3" CLAY TILE & PLASTER
" " = 4½"
145.5 CU.FT.
4" GYPSUM BLOCK & PLASTER
" " = 5¼"
186.3 CU.FT.
4" CLAY TILE & PLASTER
" " = 5½"
199.9 CU.FT.
6" GYPSUM BLOCK & PLASTER
" " = 6¼"
240.7 CU.FT.
5" CLAY TILE & PLASTER
" " = 6½"
254.3 CU.FT.
NOTE - FIGURES TO RIGHT OF DOTTED LINE SHOW NUMBER OF CU.FT. WHICH CAN BE SAVED IN TYPICAL OFFICE UNIT BY USING 2" SOLID METAL LATH AND PLASTER PARTITIONS.

THICK. FACE TO FACE OF PLASTER ·INCHES·	THICK. FACE TO FACE OF PLASTER ·FEET·	AREA TAKEN UP BY PART. IN SQ.FT.	PERCENT OF ROOM AREA	EXCESS AREA OVER 2" PART'N	PERCENTAGE OF RM. AREA OVER 2" PART.
2	.166	11.29	3.22	—	—
4¼	.35	23.80	6.77	12.51	3.55
4½	.38	25.84	7.34	14.55	4.12
5¼	.44	29.92	8.50	18.63	5.28
5½	.46	31.28	8.89	19.99	5.67
6¼	.52	35.36	10.00	24.07	6.78
6½	.54	36.72	10.43	25.43	7.21

Fig. 64—Floor Areas and Space Volumes Occupied by Office Partitions, According to Thickness.

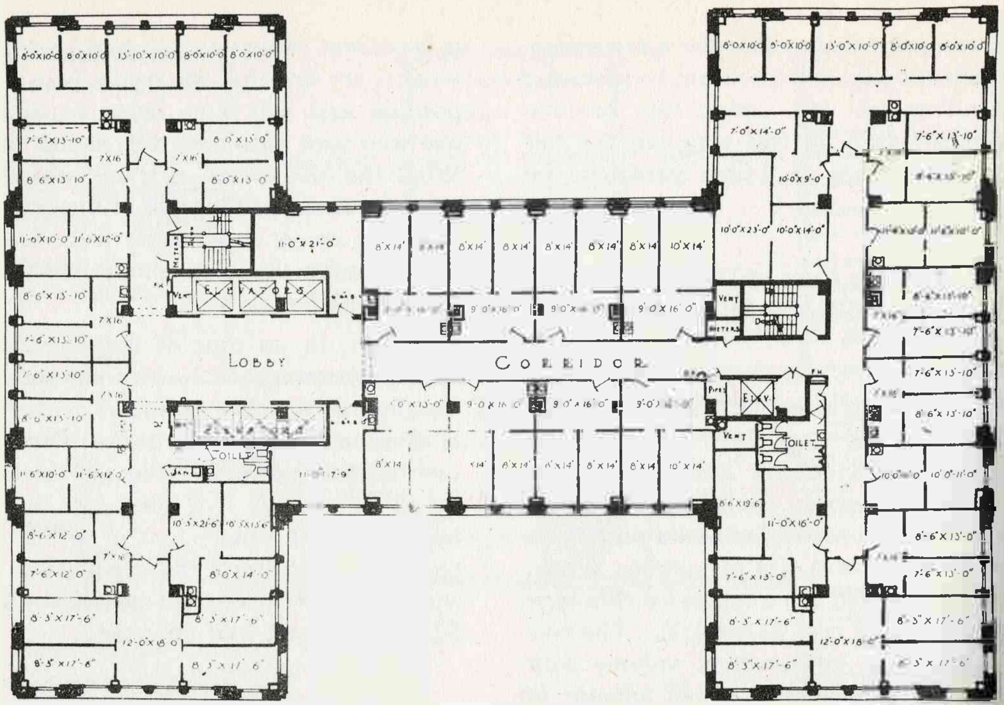


Fig. 65—Typical Office Building Floor Plan Indicating Many Opportunities for Space Saving by Utilizing 2-inch Solid Metal Lath and Plaster Partitions.

Analysis of Rentable Area Occupied by Partitions:

In an earlier part of this book it was pointed out that the amount of construction required to produce one square foot of useful area is a criterion used by building planners to determine the efficiency of modern office building design. Obsolescence is quickly revealed when the amount of construction required is excessive. From the graphic analysis on the basis of a typical office layout shown in Fig. 64, Page 55, it will be noted that the use of 2-inch shallow partitions decreases by upwards of 7 per cent the volume of construction required per unit of useful area, thus making for maximum design efficiency.

The above table also shows the percentage of the gross room area taken up by partitions of various thicknesses, the area occupied in excess of that of 2-inch partitions being shown in the extreme right column. These figures show that a block partition finishing 4½ inches in thickness takes up 4.12 per cent more of the useful area than 2-inch solid plaster partitions, while the excess for tile partitions finishing 6½ inches thick amounts to 7.21 per cent.

Masonry Partitions Waste Useful Area Valued at $19,000 in Typical Office Building:

The above method of analysis when adapted to the typical floor plan, Fig. 65, of a modern ten storey office building shows that the useful area wasted by 4-inch masonry with a finished thickness of 5½ inches is 5.67 per cent. On this basis sq. ft. of the useful floor area of 12,900 sq. ft clusive of corridors, elevator and stair shaft lost. This area, by suitable planning of the la is sufficient to provide two additional suites, of a size equal to the typical suite in Fig. 65 $2.60 per square foot average rental, tenants w each year have the use of $1,900.60 worth of on each floor or $19,000 for the 10-storey bui without additional cost to them, had 2-inch partitions been used. This, because rental usually based on the centre to centre dis between partitions.

Users of Two-Inch Partitions Receive S Amounting to 5½ Per Cent Rebate on An Rental:

In effect, the tenants of the building ju scribed, by using 2-inch metal lath partitions and every year receive a rebate on their rental of over 5½ per cent. The minimum in comparison with 3-inch masonry block pa is approximately 4 per cent while with 5-inc it amounts to as high as 7 per cent. B managers are quick to point out to pros tenants the tremendous surplus area that purchasers of space in buildings with 2-inch tions, and this is a decided advantage ju the vast amount of 2-inch solid partitions built in new and remodeled office buildings are illustrated herein.

Smaller Land Investments Saves Thousands of Dollars for Builders:

The space saving features of 2-inch metal lath solid plaster partitions are of special help to intending builders on costly property where the existence of permanent structures adjoining prevents the acquisition of land necessary for an adequate layout. The last column in the upper table in Fig. 64, Page 55, shows how much less ground area is necessary in building with 2-inch partitions, than for the partitions whose thickness is given in the first column.

If, in the building of Fig. 65, Page 56, 5½-inch partitions were used, 5.67 per cent more ground area was needed than would have sufficed with 2-inch partitions. Data compiled indicate that the land investment of the average office building is about $5.00 for each square foot of rentable area. The 7,310 square feet which would be saved with 2-inch partitions therefore represents a saving in land investment of $36,550.

Reduced Construction Cubage Decreases Investment in Structure and Cuts Fixed Charges:

The average cost of an office building with masonry protected steel framing, with brick and stone exterior is approximately 70 cents per cubic foot. Owners can provide the same useful floor area in a building with much smaller construction volume by using 2-inch partitions. Compared with a 4½-inch partition the average office suite of Fig. 64, Page 55, can be built with 199.9 cu. ft. less of building (see lower part of Fig. 64). If the total cost of the building was decreased in direct proportion to the volume, the owner would save 199.9 x 70 cents or $139.93 for each suite of this size, and in a building with 1,000 offices the saving would be $139,930.00. But on the assumption that the cost of certain items only will be affected—such as floor construction, interior decoration, heating, etc., a saving of only one-half or 35 cents will be assumed. For the typical suite this will be $69.96 and for a building with1,000 single suites, $69,960.00. For the 10-storey building of Fig. 65, Page 56, the 94,380 cu. ft. saved represent a first cost saving on the same scale (35c) of $33,033.00. On the usual basis of 10 per cent for interest, taxes, depreciation, etc., annual fixed charges can thus be reduced $3,303.30 by using 2-inch solid partitions in place of masonry partitions 4½ inches thick. To this should be added the saving of interest and taxes because of the reduced investment in land costing $36,550 and which at 10 per cent amounts to $3,655, making the total reduction in fixed charges $6,958.30.

Such savings will be frequently found to be the margin which will give one building an operating cost advantage over another equally well located, and where there is keen competition it will permit inducements to attract permanent tenants.

Other Advantages of Solid Partitions in Office Buildings:

One of the other very important advantages in the use of metal lath partitions is the low prevailing costs, because of new construction methods recently adopted. Cost information, given in greater detail in Section V, reveals that in many parts of the country 2-inch solid metal lath and plaster can be built for upwards of 10 per cent less than competing types, thus decreasing by a considerable sum the investment in construction costs.

A report shows that 84 per cent of tenants reporting, occupied under 3,000 square feet of space and of these a large percentage required less than 1,000 square feet. Thus in the average office building there will be numerous divisions of space, each requiring privacy and freedom from annoying sounds originating in adjoining offices, and which investigators have found reduce office efficiency appreciably. The use of 2-inch solid partitions continuous from floor to ceiling is indicated. Complete information with respect to their excellent resistance to the passage of sound is given in Section VI.

In Section III, Part C, will be found the great saving in dead load, which in some instances amounts to 100 pounds per lineal foot of partition, making possible substantial economies in the structural design and foundations.

Section No. III Part "C"

A Comparison of Dead Load Effect of Partitions on Design of Structural Frame

Substantial reductions in the dead load carried by the structure effect amazing savings in the cost of the steel or reinforced concrete structural frame. This section discusses the structural savings made possible through the reduction in partition dead load by the use of 2-inch solid metal lath partitions which weigh only 18½ pounds per square foot of partition surface, as compared to 3-inch clay tile plastered both sides which weigh 28 pounds for an equal area. Thus for a partition 10 feet high the dead load saving using the former is 95 lbs. per lineal foot of partition.

Effect of Partition Dead Load Increases With Height of Building:

These savings are not so apparent in buildings of residential or office occupancy 4 stories or less in height, but for taller buildings the weight of partitions has considerable bearing on the economy of design since the effect of their weight on the cost of the columns increases as the square of the number of stories. Costs also increase directly with floor area and number of floors.

In most concrete or steel frame buildings it is customary to assume a certain number of pounds per square foot, attributable to the weight of the partition, uniformly distributed over the entire floor area, and design the structure so that the partition can be safely located anywhere on the floor. Then a substantial difference in the distributable load, due to adopting lighter weight partitions, must have an appreciable effect both on floor structure and columns. Where the weight is not distributed and beams and girders are designed for specific partition loads the savings are roughly in the same proportions as for distributed loads. The dead load saving by using metal lath partitions in tall office buildings is carried through not only the floor and column design, but into that of the foundations as well.

In a certain city in eastern Canada, 2-inch solid metal lath and plaster partitions are considered as covered by the live load without increase. This became most important in the case of a multiple storey building which, when it was partly constructed, was found to overload the basement columns by the partition loads, which were classed as dead loads. By using the 2-inch solid metal lath and plaster partitions, classed as live load, the difficulty was surmounted and the building completed without increasing basement columns.

A—Floor Loadings for Typical Floor:

In a hotel building with rooms about 11′ 6″ x 19′ 6″ with bathrooms and closets as in the typical layout of Fig. 62, Page 53, we find that the total weight of masonry partitions per sq. ft. of floor area is 45 lbs., assuming the weight per sq. ft. of surface of the partitions themselves to be 27 lbs. As 2″ plaster partitions weigh only 18.5 lbs. per sq. ft. of partition or 32% less than clay tile partitions, the weight of these partitions will be only about 31 lbs. per sq. ft. of floor area of building. Now assuming the dead load of floor and ceiling construction to be 70 lbs. per sq. ft. and live load 40 lbs. per sq. ft., we have, when clay tile partitions are used, a total dead and live load of 70+40+45=155 lbs. per sq. ft. while, when solid plaster partitions are used, the total dead and live load is 70+40+31=141 lbs. per sq. ft., or a saving of 14 lbs., or 9 per cent.

B—Analysis of Typical Reinforced Concrete Hotel Building:

From the design of many actual hotel buildings of reinforced concrete we find that the weight of reinforcing steel in girders, beams, joists and floor slabs averages about 3 lbs. per sq. ft.

Saving in Beam, Girder, Joist and Floor Reinforcing Steel:

In order to get at a result, which is easily understood, we shall neglect possible saving in concrete due to the lightening of the floor construction, and will assume that the saving in reinforcing steel is in proportion to the saving in total weight, or 3.0×9/100=.27 lb. per sq. ft.

Reinforcing steel costs on an average 3.75 cents per lb. in place, therefore for each square foot of floor area there is a saving of .27×3.75=1.01 cents. For a typical hotel of 10,000 sq. ft. floor area per floor there are the following savings for various numbers of stories "n"

Number of stories "n"	8	12	16	20	24
Total sq. ft. floor area	80,000	120,000	160,000	200,000	240,000
Saving in beam, girder, joist and floor reinforcing steel	$808	$1,212	$1,616	$2,020	$2,424

Savings in Columns and Footings, Reinforcing Steel:

To find the saving in the columns, we can proceed in the following manner:—We shall assume that the lightening of the floors will effect a lightening of the vertical steel reinforcement.

Most ordinances allow a stress of 9,000 lbs. per square inch of reinforcement.

Now, 1 square inch of vertical steel, 1 ft. long, weighs, including overlaps, 4 lbs. One square inch of vertical steel, 1 ft. long, costs, @ 3.75 cents per lb. in place, $4 \times 3.75 = 15$ cents.

or 9,000 lbs. of weight, carried one foot in height, costs 15 cents.

or, 1,000 lbs. of weight, carried one foot in height, costs $15 \div 9 = 1.67$ cents.

If we save "p" lbs. on each square foot of floor of a many-storied building (say of n stories); the average saving in weight will be the same as if we saved $p \times n/2$ lbs. for the total height on the building. Then let h be the average storey height, we save for each sq. ft. of building of the height of $n \times h$, just $p/2 \times n^2 \times h$ lbs. to be carried 1 ft. in height. Now if the average floor area be A sq. ft. we save $A \times p/2 \times n^2 \times h$ pound-foot.

We have seen that 1,000 lbs. carried one foot cost 1.67 cents, hence the total saving is $A/1000 \times p/2 \times n^2 \times h \times 1.67$ cents.

These formulas may be applied to any specific job with ease.

For example: Assume a hotel about 60 ft. by 165 ft. in plan with 9 ft. ceiling height.

Then $A = 10{,}000$ sq. ft. $h = 10.5$ ft. $p = 14$ lbs. (as shown above in [A]).

Substituting these values in the formula for various numbers of stories, "n," we have:

Number of stories "n"	8	12	16	20	24
Saving in Column Steel	$785	$1,765	$3,140	$4,900	$6,140
Add 15% for footings	118	265	471	735	921
Total saving in column and footing steel	$903	$2,030	$3,611	$5,635	$7,061

Total Savings in Cost of Reinforcing Steel:

Thus the total savings in dollars of reinforcing steel alone are, for buildings of the various number of stories:

Number of stories "n"	8	12	16	20	24
Total Savings in Reinforc-Steel	$1,711	$3,242	$5,227	$7,655	$9,485

C—Analysis of Saving in Skeleton Steel Construction:

Assume a building in steel skeleton construc of the same size as analyzed in "B."

Saving in Structural Steel Girders and Bea

The weight of structural steel girders and bea is close to 10 lbs. per square foot of floor. Of total savings of 9 per cent in the combined de and live loads due to use of 2-inch solid partitio (instead of 3-inch clay tile and plaster), ⅔ or 6 cent may be used to reduce the required weigh the floor beams and girders.[1]

Thus 6% of 10 lbs. = 0.6 lb. which @ 4½c lb. makes a saving of 2.7c per square foot. For average hotel of 10,000 sq. ft. area per floor, th are at 2.7c per sq. ft. the following savings various numbers of stories "n." (See page wid table below.)

Savings in Columns and Footings, Struct Steel:

The savings in columns can be obtained in similar way as for reinforced concrete construct

One square inch of metal carries 14,000 lbs. a weights with connections 4 lbs. and costs at cents a lb., 18 cents per ft.; or 1,000 lbs. carr 1 foot cost $18 \div 14$ cents $= 1.285$ cents.

Thus the savings in columns, with the sa notations as before of: $A/1{,}000 \times p/2 \times n^2 \times h \times 1$ cents is, plus 15% added for the footings for various heights of building:

Number of stories "n"	8	12	16	20	24	30
Savings in columns and footings	$695	$1564	$2784	$4344	$6256	$9775

Total Savings in Cost of Structural Steel:

The total saving in structural steel and in footings for the various number of stories is, the fore:

Number of stories "n"	8	12	16	20	24	[illegible]
Total Savings	$2855	$4804	$7104	$9744	$12736	$17875

Height (number of stories "n")	8	12	16	20	24	30	40
Total Floor Area, sq. ft.	80,000	120,000	160,000	200,000	240,000	300,000	[illegible]
Saving in structural steel beams and girders	$2,160	$3,240	$4,320	$5,400	$6,480	$8,100	[illegible]

Savings Applied to Cost of Partitions in Typical Hotel:

In a 10-story reinforced concrete hotel of the size of Fig. 63, page 54, assuming 8½ stories divided into guest rooms, there is a savings on the basis of Article B, of approximately $4145 in the concrete reinforcing steel. Divided among the approximately 36,000 sq. yds. of metal lath partitions it shows a saving of 11.5 cents per square yard which must be credited to the use of metal lath as against the heavier clay tile.

The above does not take into account the a tional savings in concrete and concrete form throughout the structure.

For structural steel design there is a corresp ing saving on the basis of Article C, of $6652. amounts to a saving of 18½ cents per square creditable to the use of metal lath as again heavier clay tile.

Nor does this take into account additional ings in columns and footings due to the decrea ctual dead load of the floor which is made possible y the lighter partition load.

---

[1] The full 9 per cent is not taken since decreasing the load by a certain percentage does not decrease the amount of steel required in the same proportion. A study of standard beam tables shows that the weight of steel is reduced approxima 10 lbs. for a corresponding reduction of 15 lbs. in the carried, hence the factor of 2/3.

Greatly Increased Savings in Tall Buildings:

Fig. 66 shows that in a reinforced concrete hotel 16 stories high, total savings are three times those n an 8 story building with the same ground area.

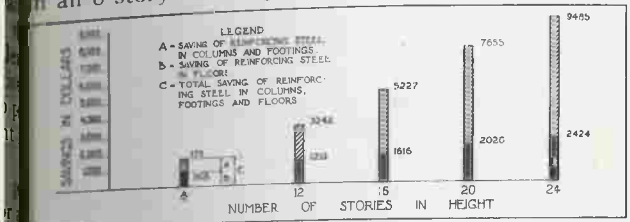


Fig. 66—Smaller Partition Dead Load Results in Impor-ant Cost Savings in Structural Design of Reinforced Concrete—Frame Building.

Thus doubling the height triples the saving while or a 24-story building savings are 5½ times as reat as for an 8-story structure. In a building with plan and area approximately that of Fig. 63, Page 54, and 20 stories high, the savings in reinforcing steel are over $16,000 and average 20 cents per square yard of partition. Note that this is nearly twice as much per yard as in the building with same ground area but with only 8½ subdivided floors.

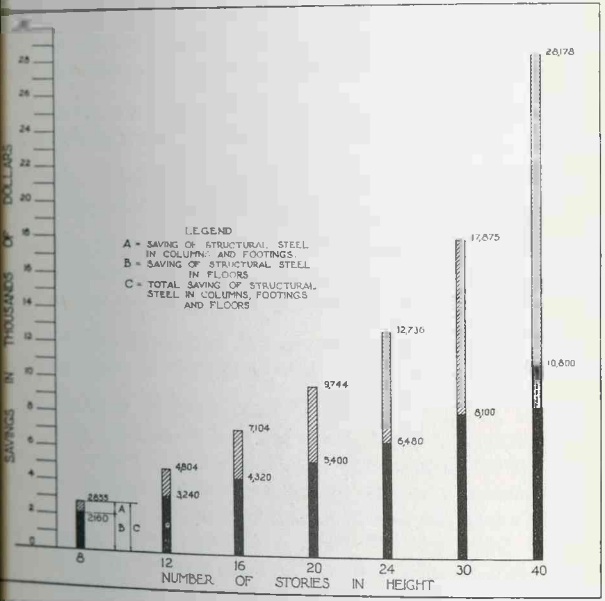


Fig. 67—Smaller Partition Dead Load Saves in Structural Design in Steel Frame Building.

In a steel frame building the relative savings in floor and column steel are as in Fig. 67, Page 61. As in reinforced concrete, the construction cost savings increase more rapidly than the increase in height of the building, the 30-story building saving almost double that of the 20 story, and the 40 story saving almost three times that of the 20 story. For the 40-story building with floor plan as in Fig. 63, Page 54, the total saving in structural steel due to using 2-inch metal lath partitions in place of 3-inch clay tile amounts to $84,800. This is 36 cents per yard of partition, surely a sum which cannot be overlooked in the quest for economy in these days of buildings of towering heights.

Office and Similarly Subdivided Buildings Afford Equal Opportunity for Structural Savings:

In the preceding, typical hotel layouts have been selected to demonstrate structural savings. Similar opportunities exist in office buildings such as shown in the plan of Fig. 65, Page 56.

Although the partition weight per unit of floor area is slightly less, the proportionate structural savings using metal lath partitions in place of tile are about the same, so that the savings per square yard of partition are comparable with those for hotels. Other buildings, subdivided similarly, afford the same field for saving.

Original Structural Design Must Contemplate Use of Lightweight Metal Lath Partitions to Make Savings Possible:

Naturally no change to the use of metal lath partitions with their saving of 14 pounds per square foot can effect savings in structural or reinforcing steel if the change is made subsequent to the completion of the design. Therefore architects and engineers should contemplate their use in the original planning.

Section No. III Part "D"

Erection of Bucks, Studding, Etc.

General Outline of Erection:

Figure 68, Page 64, shows graphically the various teps in erection of solid plaster partitions. With slight variations in methods of attaching studs to loor and ceiling construction, the same procedure s followed for all types of buildings both "fireproof" nd non-fireproof, viz.:

First, the partition is laid out as at "(a)," in ccordance with the architect's drawings using a halk line on the floor and then plumbing up and marking the ceiling.

Second, the door bucks are then placed, plumbed nd braced temporarily either to floor or ceiling.

Third, holes are punched for the channel studs nless the lower ends of studs are nailed direct to he floor (or floor bucks or channel runners are installed where other means of attachment are used) nd the channel studs are erected as at (b).

Fourth, a temporary brace to align and stiffen the hannels is wired to the studs (See "c").

Fifth, Electrical conduit and outlets are next placed by electrical workers.

Sixth, Metal lath is securely wired to the side of he channels away from the horizontal braces with proper lap on side walls and ceiling (d).

Seventh, Grounds for plaster and trim are then pplied (d). The partition is now ready for plaster.

Eighth, A scratch coat (1) is first applied to the ath side. When it has set fairly hard a backing up plaster coat (2) is spread over the channel side, the plaster being applied so as to entirely cover the studs. It is straightened out with the plasterer's rod nd darby to the grounds ready for the finish coat. The third or brown coat (3) is then placed over the cratch coat on the lath side coming flush with the grounds after which the fourth and fifth (finish) coats are applied on opposite sides making a solid plaster partition two inches thick.

Ninth, When the plaster is thoroughly dry trim s attached as in the usual manner, wiring is completed and the partition is ready for the painter and decorator.

The foregoing is a brief summary of the usual procedure in constructing this type of partition. t is simple and done quickly and economically. Each of the steps taken will now be discussed in etail with the help of larger scale diagrams, photographs and references to the specifications.

Door Bucks and Their Erection:

Bucks for partitions are of wood or metal. Under the regulations of most building codes in which doors and the trim around them, even in fireproof buildings, may be of wood, wood bucks are permissible. In some cities regulations provide that buildings for certain occupancy and those above certain great heights be equipped with incombustible doors and in these the metal door buck and trim are used. Furthermore, manufacture of architectural sheet steel products has reached the point where it is frequently economy to use steel bucks and trim even when not required for fire protection; and the indestructibility, sanitary appearance, etc., have brought metal door casings here to stay. Whether the architect prefers wood or metal, manufacturers of millwork and steel door and trim manufacturers have co-operated to provide a complete line of bucks and trim for solid and hollow metal lath partitions.

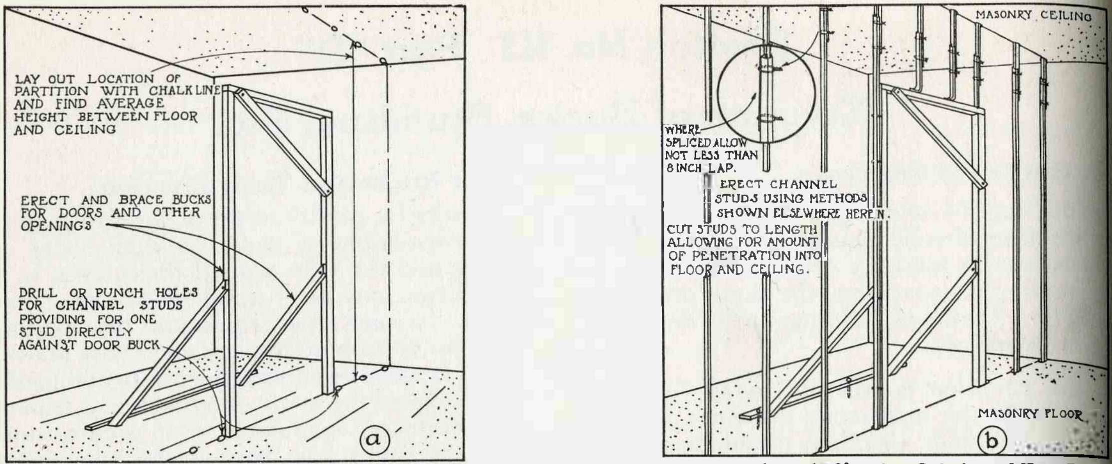
Selecting Straight Lumber for Bucks Saves Time in Erection and Application of Trim:

Wood bucks should be specified to be made from straight grained lumber substantially free from knots. This will assure a sound nailing base and will expedite the erection of trim for the finished opening.

Two-inch partitions have been standard for so many years that wood-working mills supply the necessary bucks on short notice in a variety of sizes to meet all requirements. For the solid partition the buck must be full two inches in at least one dimension since it serves as a ground for the application of plaster. Where $2\frac{1}{4}$ or $2\frac{1}{2}$-inch partitions are employed the thickness of the buck is increased to correspond. Bucks cut at the mill out of dressed lumber of the same nominal size will not give the full 2 by 2 inch size which is preferred. However, where this is not feasible or greater economy and speed are wanted, builders purchase dressed 2 x 10's (actually $1\frac{3}{4}$ inches thick), a power saw is installed on the job and bucks 2 x $1\frac{3}{4}$ are cut from this stock with but little waste. Bucks for 3-inch hollow partitions are made from 2 x 4's while those for 4-inch partitions are cut from 2 x 10's each of which make two.

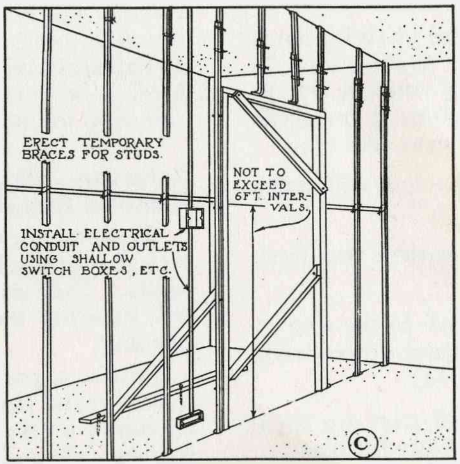
Bracing of Door Bucks:

Figs. 69, 70 and 71 show simple methods used for erecting and bracing door bucks. Before wood bucks are erected the jamb and head members should be braced against each other to prevent twisting. After erection the entire buck must be

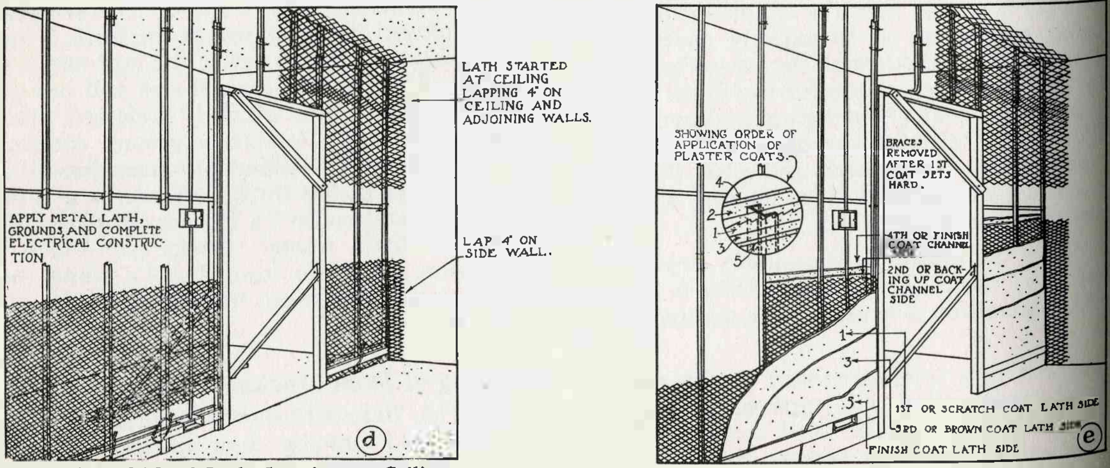

LAY OUT LOCATION OF PARTITION WITH CHALK LINE AND FIND AVERAGE HEIGHT BETWEEN FLOOR AND CEILING
ERECT AND BRACE BUCKS FOR DOORS AND OTHER OPENINGS
DRILL OR PUNCH HOLES FOR CHANNEL STUDS PROVIDING FOR ONE STUD DIRECTLY AGAINST DOOR BUCK
a
MASONRY CEILING
WHERE SPLICED ALLOW NOT LESS THAN 8 INCH LAP.
ERECT CHANNEL STUDS USING METHODS SHOWN ELSEWHERE HEREIN.
CUT STUDS TO LENGTH ALLOWING FOR AMOUNT OF PENETRATION INTO FLOOR AND CEILING.
MASONRY FLOOR
b

Location Layout, Erection and Plumbing of Bucks, Anchorage for Studs (See Figs. 73B to 79 incl. for other methods)

Erection of Studs Showing Splicing of Two-Piece Studs


ERECT TEMPORARY BRACES FOR STUDS.
NOT TO EXCEED 6 FT. INTERVALS.
INSTALL ELECTRICAL CONDUIT AND OUTLETS USING SHALLOW SWITCH BOXES, ETC.
c

Temporary Bracing of Studs, Installation of Electrical Conduits, Outlets, etc.


LATH STARTED AT CEILING LAPPING 4" ON CEILING AND ADJOINING WALLS.
APPLY METAL LATH, GROUNDS, AND COMPLETE ELECTRICAL CONSTRUCTION
LAP 4" ON SIDE WALL.
d
SHOWING ORDER OF APPLICATION OF PLASTER COATS.
4
2
1
3
5
BRACES REMOVED AFTER 1ST COAT SETS HARD.
4TH OR FINISH COAT CHANNEL SIDE
2ND OR BACKING UP COAT CHANNEL SIDE
1
3
5
1ST OR SCRATCH COAT LATH SIDE
3RD OR BROWN COAT LATH SIDE
FINISH COAT LATH SIDE
e

Application of Metal Lath, Lapping on Ceiling and Abutting Walls, Application of Grounds and Screeds

Various Steps in Application of Plaster

Fig. 68—The A, B, C's of Solid Metal Lath and Plaster Partition Construction.

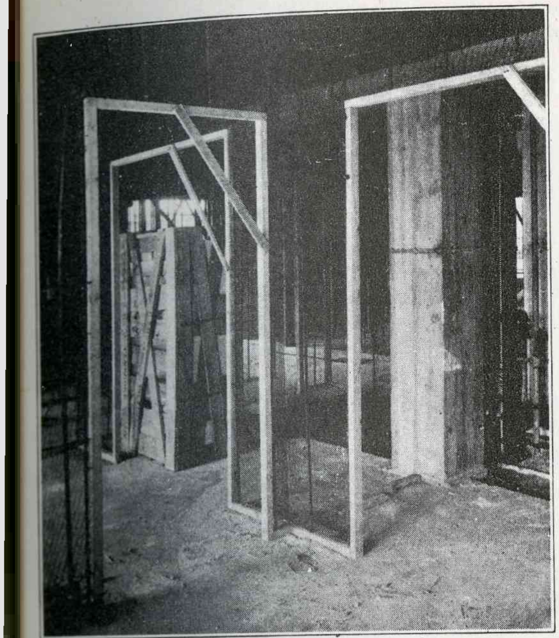


Fig. 69—Method of Bracing to Keep Wood Bucks Square.

carefully plumbed in both directions before bracing to the floor or ceiling as in Fig. 70. In the partitions shown in Fig. 69 the temporary bracing to floor or ceiling has already been removed, but the diagonal bracing of the frame remains in place until after plastering.

Anchoring the Door Buck to the Floor:

Where wood floor runners are used on masonry floors as in Fig. 69 or on wood floors the wood buck is carried down to the floor and nailed to the end of the runner or the floor, as the case may be.

Where wood floor runners are not used the wood door bucks should be secured to masonry floors by nailing a piece of sheet metal to the bottom of the buck (Fig. 76, Page 69) and then nailing in turn with hardened masonry or stub nails to the floor. Another method is by drilling and plugging holes in the floor and toe-nailing the bucks to the plugs.

Metal Bucks and Their Attachment to Floors:

Metal bucks may be classified as of the solid or unfilled (with plaster) type, and the hollow type usually filled with plaster.

The solid type of metal buck (shown in Figs. 117A and B, Page 94) is specially designed for solid metal lath partitions. It is almost completely embedded in the 2-inch plaster slab and is provided with lugs at bottom and an extension on each side at the top which facilitates attachment to both floor and ceiling construction and makes for rigid construction. It is punched to receive the ends of the lath sheets so that the channels each side of the opening may be omitted.

Each buck is provided with special corner reinforcement at the junction of the jamb members and the head, furnishing additional strength at these vital points and assuring automatic squaring of the frame.

Other solid type bucks (see Figs. 116-119-120 and 123, Page 94) are customarily bolted to the nearest stud—frequently an angle or tee, with its outstanding leg punched for wire tying. The lower ends of the metal buck are secured to the floor by stub or hardened masonry nails or expansion bolts. The head section is wired to a cross channel connecting the studs either side of the buck.

The hollow or filled types are usually combined buck, jamb and trim on which a separate member for buck is not provided. That illustrated in Fig. 121, Page 94, is provided with a new type of metal

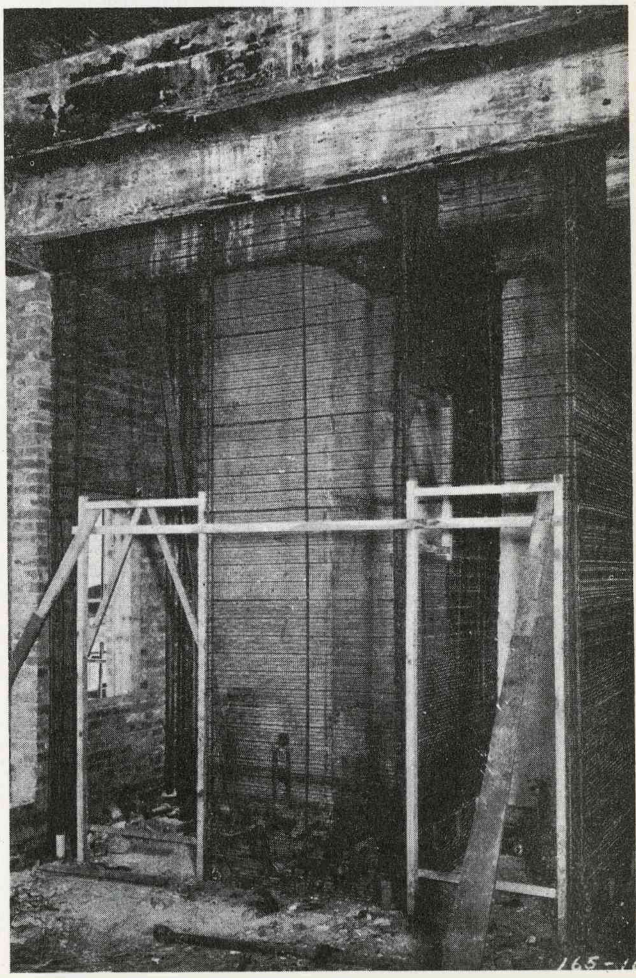


Fig. 70—Cross-Bracing of Buck and Diagonal Bracing to Floor.

anchor through which both the adjacent and the second channel away from the buck, pass from floor to ceiling, making for very substantial construction. It is further strengthened by the plaster fill which is forced into the buck as the plastering proceeds upward. In Fig. 122, Page 94, the grouting of the casing provides most of the rigidity although anchors to the channel studs are also furnished. Fig. 71 shows the first step in the erection of the combined metal bucks and frame and Fig. 124, Page 95, a later stage.

Anchoring and Erecting Channel Studs at Openings:

With the door bucks in place, the next step is to place the channel studs each side of the buck and then proceed with the erection of the remaining studs.

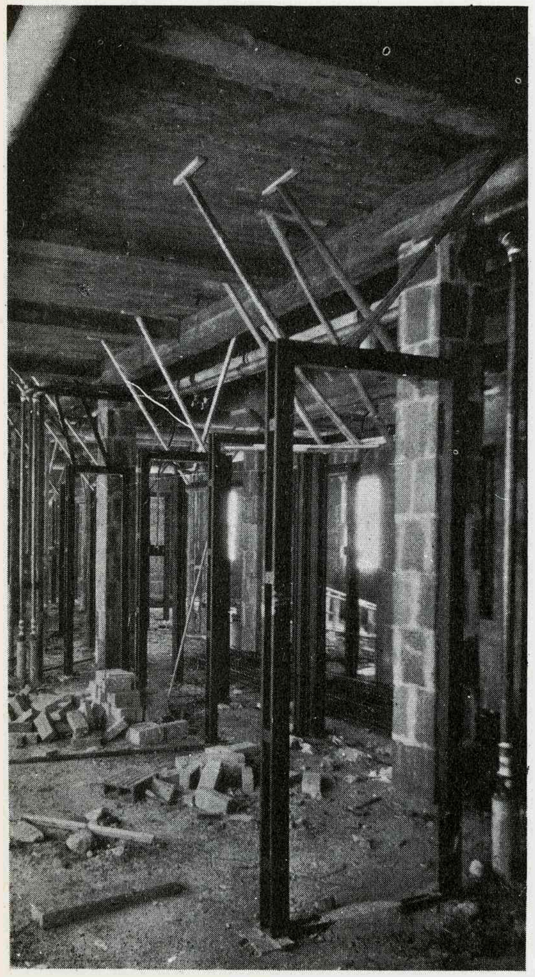


Fig. 71—Temporary Bracing for Plumbing Combined Steel Buck and Frame.

Channel Stud Should Always Be Placed Each Side of Door Buck:

The resistance to impact of slamming door prevention of plaster cracks depends upon sat tory details at the openings.

It is therefore very important that there al be a channel stud close up to the plaster si every door buck and at similar openings, to satisfactory connection between the door frame the partition and this stud must run from flo ceiling. For very heavy doors the studs each and over doors should be doubled by nesting fla and wiring together. (See also next paragr

Door Buck Channels Should Be Firmly Attached to Floor and Ceiling:

It is very advisable to specify that the door channels be firmly anchored to the masonry or construction at floor and ceiling. This is espec desirable in the case of a heavy door where usage is expected as in school buildings, storero warehouses, etc.

Loose vs. Rigid Connection Between Studs and Bucks:

Fig. 72, Page 67, illustrates methods adopted various lathers for the attachment of the nea channel to the door buck.

In most localities the buck is not rigidly secu to the nearest channels. The theory is that if rigidly attached very hard usage would eventu cause formation of plaster cracks beyond the standing legs of channels because these would with the buck, and the cracks would show be edge of casing. Therefore the channel is separ slightly from the buck so that any crack w might occur would come between them and remain permanently invisible behind the casin

Probably the simplest and most commonly method to accomplish this purpose is to drive nails one on each side of the channel and "d wire" the channel to them as in Fig. 72A, Pa About three-eighths inch is left between channel buck for ease in tying the end of the lath sheet to channel. The use of one nail as in (B) is not rec mended as the buck is apt to twist before plaste and make application of trim more difficult.

Others prefer a rigid connection between nea stud and buck and assume that the constru will then be strong enough to fully resist any im In this case the stud is usually nailed or screw the buck as in Fig. 72C. Carrying this a step fu some architects favour heavier studs for the pos nearest the buck and recommend double cha or use angles or tees, etc. (Fig. 72 D, E and Extra strong construction over door openin described in a following paragraph.

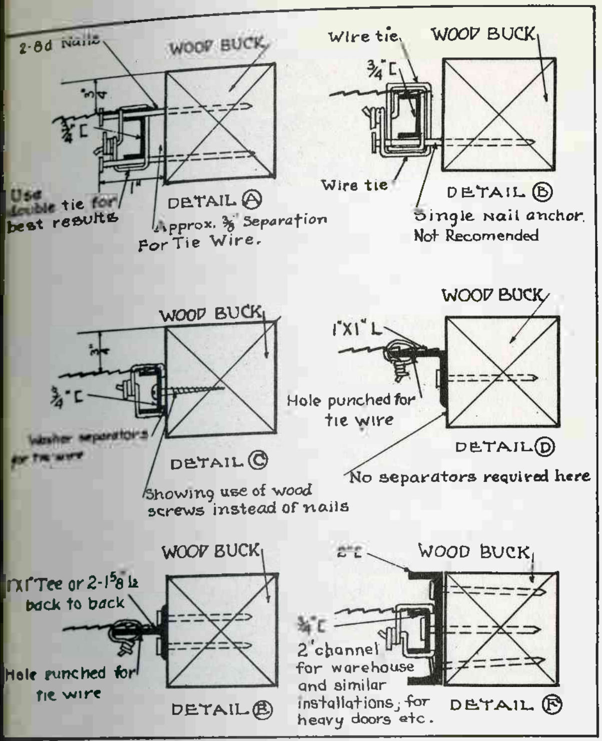

2-8d Nails
WOOD BUCK
$\frac{3}{4}$" C
Use double tie for best results
1"
DETAIL Ⓐ
Approx. $\frac{3}{8}$" Separation For Tie Wire.
Wire tie
WOOD BUCK
$\frac{3}{4}$" C
Wire tie
DETAIL Ⓑ
Single nail anchor. Not Recomended
WOOD BUCK
$\frac{3}{4}$" C
Washer separators for tie wire
DETAIL Ⓒ
Showing use of wood screws instead of nails
WOOD BUCK
1"X1" L
Hole punched for tie wire
DETAIL Ⓓ
No separators required here
WOOD BUCK
1"X1" Tee or 2-1$\frac{5}{8}$ Ls back to back
Hole punched for tie wire
DETAIL Ⓔ
2" C
WOOD BUCK
$\frac{3}{4}$" C
2" channel for warehouse and similar installations; for heavy doors etc.
DETAIL Ⓕ

Fig. 72—Methods Used for Attaching Nearest Channel to Door Buck.

A washer or staple is usually placed between the channel and buck to facilitate tying (See Fig. 72C). Such methods are quite commonly used where angles or tees are used as at "D" and "E". It is cheaper to use a washer than to punch the outstanding leg of the angle or tee for tying purposes as shown.

For heavy duty where exposure of angle or channel is not objectionable as in storage warehouses, factories, etc., still greater strength is obtained by two-inch angles or channels used continuous from floor to ceiling each side of opening as in Fig. 72F.

Attaching Channels to Tops of Bucks:

For average construction whenever wood bucks are used around doors, the lower end of the short or jack studs over the doors are wire tied directly to 2-inch nails driven into the head member of the buck without employing a horizontal channel at this point.

For heavy doors, wide openings and extra good construction it is recommended that a horizontal channel be placed over the top of the wood buck and be securely tied to the studs each side of the opening by bending a shoe at each end. The wood buck is in turn held in place by the horizontal channel by the same methods (wire-tying to nails, etc.) described in a preceding paragraph for the sides of the buck.

Anchoring and Erecting Channel Studs for the Partition Proper:

Figs. 73, 74, 75 and 76 show methods used in anchoring and erecting channel studs in various types of fireproof buildings. Each method has been used extensively in various parts of the country and has advantages to commend it. Notes in the diagrams make them self-explanatory.

In erecting channel studs either one-piece single unit studs or two-piece studs spliced near the ceiling are used depending on conditions at the building.

Saving in Erection Costs Using Single-Piece Studs Under Following Conditions:

Single-piece studs, because they require no splicing and require handling of only one piece save erection costs in many, but not all cases. They are recommended under the following conditions; the architect's attention being especially directed to the savings in partition erection when suspended ceilings are used as in (a) below:

(a) Where a suspended ceiling is used as shown in the upper part of Figs. 73B, Page 68, etc., the upper ends of studs project into the space above the ceiling. This takes care of considerable variation in length and one-piece studs are most economical. (b) Somewhat similar facilities for vertical adjustment are provided in hollow tile construction Fig. 75B, Page 68. This space also permits of expansion of the studs vertically to resist distortion of the partition in the event of fire. (c) Where concrete is fairly green and can be easily notched for ends of studs, and provided floor and ceiling are parallel within an inch in a 10-foot distance. (e) Single studs are also recommended for wood-joisted construction for conditions as in Fig. 79, Page 70.

Single-piece studs are not recommended for maximum erection economy in buildings where holes have to be cut in concrete which has set hard and especially where there is considerable variation in distance between floor and ceiling slabs, thus requiring cutting each channel to length separately.

Two-Piece Studs Most Economical for Following Conditions:

The advantage in the two-piece stud is that both parts of all studs can be cut the same length, the amount of lap between the upper and lower portions taking care of variations in the distance between floor and ceiling. This simplifies cutting to length and also increases rapidity of erection. The "two-piece method" can be used in every place where one piece studs are used and has a further advantage in permitting adjustment caused by expansion in case of fire. It is recommended specifically:

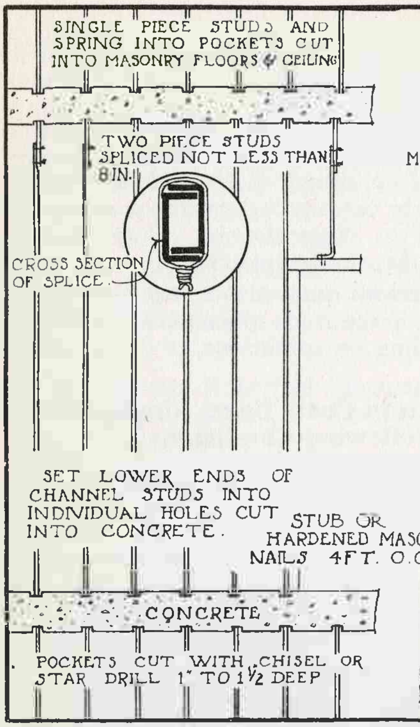

SINGLE PIECE STUDS AND SPRING INTO POCKETS CUT INTO MASONRY FLOORS & CEILING
TWO PIECE STUDS SPLICED NOT LESS THAN 8 IN.
CROSS SECTION OF SPLICE
SET LOWER ENDS OF CHANNEL STUDS INTO INDIVIDUAL HOLES CUT INTO CONCRETE.
CONCRETE
POCKETS CUT WITH CHISEL OR STAR DRILL 1" TO 1½ DEEP

Fig. 73A—Anchorage in Flat Slab Concrete Floors and Ceilings

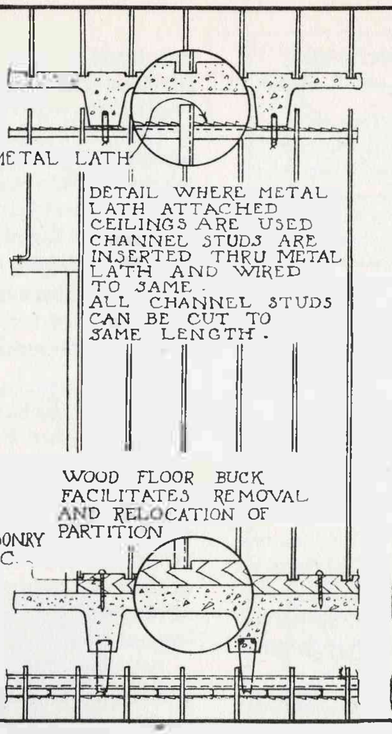

METAL LATH
DETAIL WHERE METAL LATH ATTACHED CEILINGS ARE USED CHANNEL STUDS ARE INSERTED THRU METAL LATH AND WIRED TO SAME.
ALL CHANNEL STUDS CAN BE CUT TO SAME LENGTH.
STUB OR HARDENED MASONRY NAILS 4 FT. O.C.
WOOD FLOOR BUCK FACILITATES REMOVAL AND RELOCATION OF PARTITION

Fig. 73B—(Above) Upper Ends of Studs Secured to Contact Metal Lath Ceiling Attached to Concrete Joists

(Below) Lower Stud Ends Secured to Wood Floor Buck, for Removability (Office Buildings)

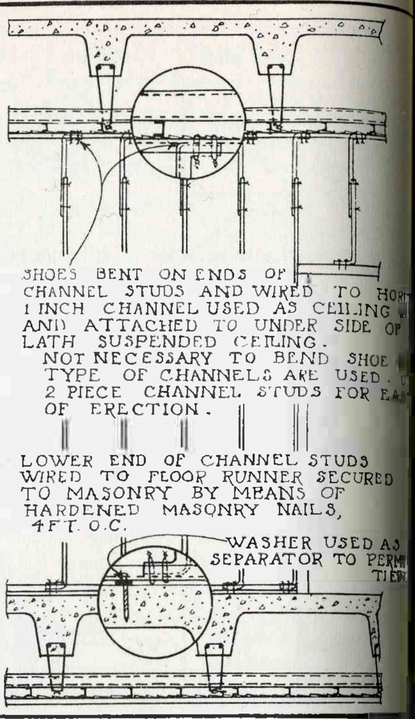

SHOES BENT ON ENDS OF CHANNEL STUDS AND WIRED TO HORI
1 INCH CHANNEL USED AS CEILING
AND ATTACHED TO UNDER SIDE OF
LATH SUSPENDED CEILING.
NOT NECESSARY TO BEND SHOE
TYPE OF CHANNELS ARE USED.
2 PIECE CHANNEL STUDS FOR EA
OF ERECTION.
LOWER END OF CHANNEL STUDS WIRED TO FLOOR RUNNER SECURED TO MASONRY BY MEANS OF HARDENED MASONRY NAILS, 4 FT. O.C.
WASHER USED AS SEPARATOR TO PERM
TIER

Fig. 74A—(Above) Upper Ends of Studs Secured to Suspended Metal Lath Ceiling Under Masonry Floor

(Below) Lower Ends Secured to Metal Channel Floor Runner on Mason Floor

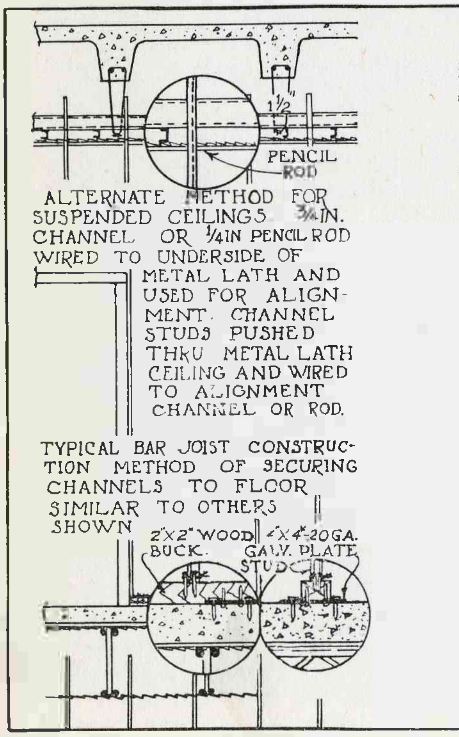

1½"
PENCIL ROD
ALTERNATE METHOD FOR SUSPENDED CEILINGS ¾ IN. CHANNEL OR ¼ IN PENCIL ROD WIRED TO UNDERSIDE OF METAL LATH AND USED FOR ALIGNMENT. CHANNEL STUDS PUSHED THRU METAL LATH CEILING AND WIRED TO ALIGNMENT CHANNEL OR ROD.
TYPICAL BAR JOIST CONSTRUCTION METHOD OF SECURING CHANNELS TO FLOOR SIMILAR TO OTHERS SHOWN
2"X2" WOOD BUCK.
4"X4" 20 GA. GALV. PLATE STUD

Fig. 74B—(Above) Upper Ends of Studs Pushed Through Suspended Ceiling

(Below) Another Method for Attaching Wood Buck to Concrete Floors—Steel Joist Construction

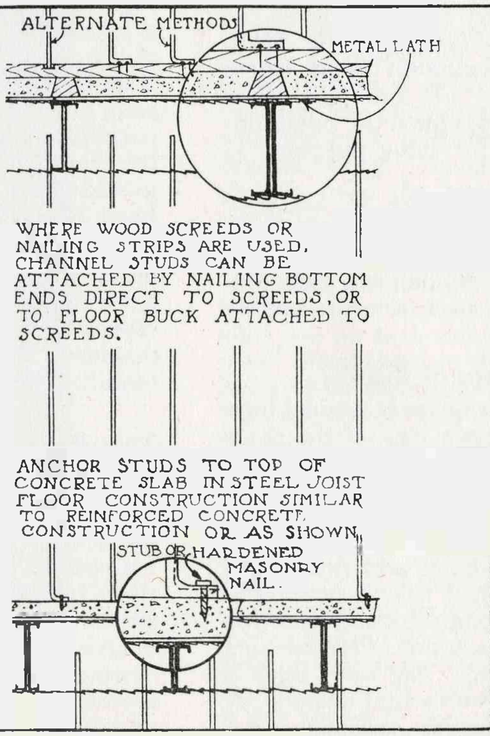

ALTERNATE METHODS
METAL LATH
WHERE WOOD SCREEDS OR NAILING STRIPS ARE USED, CHANNEL STUDS CAN BE ATTACHED BY NAILING BOTTOM ENDS DIRECT TO SCREEDS, OR TO FLOOR BUCK ATTACHED TO SCREEDS.
ANCHOR STUDS TO TOP OF CONCRETE SLAB IN STEEL JOIST FLOOR CONSTRUCTION SIMILAR TO REINFORCED CONCRETE CONSTRUCTION OR AS SHOWN.
STUB OR HARDENED MASONRY NAIL.

Fig. 75A—(Above) Studs Secured to Wood Floor Buck and to Metal Lath Ceiling—Steel Joist Construction

(Below) Lower Ends of Studs Attached Direct to Concrete with Masonry Nails—Steel Joist Construction

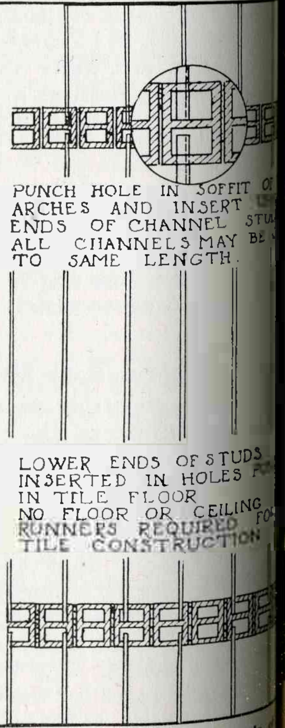


Fig. 75B—Top and Bottom Ends Studs Secured to Structural Tile Flo Construction Without Use of Run or Floor Bucks

(a) Where studs run from floor to ceiling slab and where distance between floor and ceiling slabs varies more than 1 inch in 10 feet,

(b) Where concrete is very hard and has to be notched with hammer and chisel,

(c) In general where a metal lath ceiling is not available.

Requirements for Anchoring the Studs to Floor and Ceiling:
Concrete Floors and Ceilings:
Plastered on Concrete:
Permanent Partitions:

The hardness of the concrete determines which method is most economical.

(a) Where concrete is fairly green and also where electric or pneumatic driven chisels or drills are available, notching as in Fig. 73A, Page 68, is the strongest type of construction and recommended for apartments and hotels where removability is not expected.

(b) Where concrete is fairly hard the construction as in Fig. 76C with notching only for every fifth channel, will be found economical. The partition will not be as stiff for nailing trim as in (a). This construction permits all intermediate channels between those notched-in, to be one-piece channels of equal length.

(c) Where concrete is hard the system of Fig. 76E with a floor channel secured to wood plugs at 4-foot intervals is probably more expensive than in (b) but is more rigid construction.

(d) For any type of concrete the use of slotted or pronged floor and ceiling runners or of stud shoes on ordinary channels secured to masonry by hardened nails is strongly recommended for time-saving erection.

(e) Where wood floor bucks are permissible the construction as in Fig. 76F is recommended. The buck is both plastering ground and nailing for wood base, and permits removability.

(f) For fairly green concrete, and especially on 2-inch slab reinforced floors without nailing strips, the construction as in Fig. 76D is most economical, although this construction is not so strong as in par. (a). Two-piece channels should be used.

(g) A type of channel now available has flanges so devised as to greatly facilitate erection when floor and ceiling runners are used. See Fig. 77, Page 70.

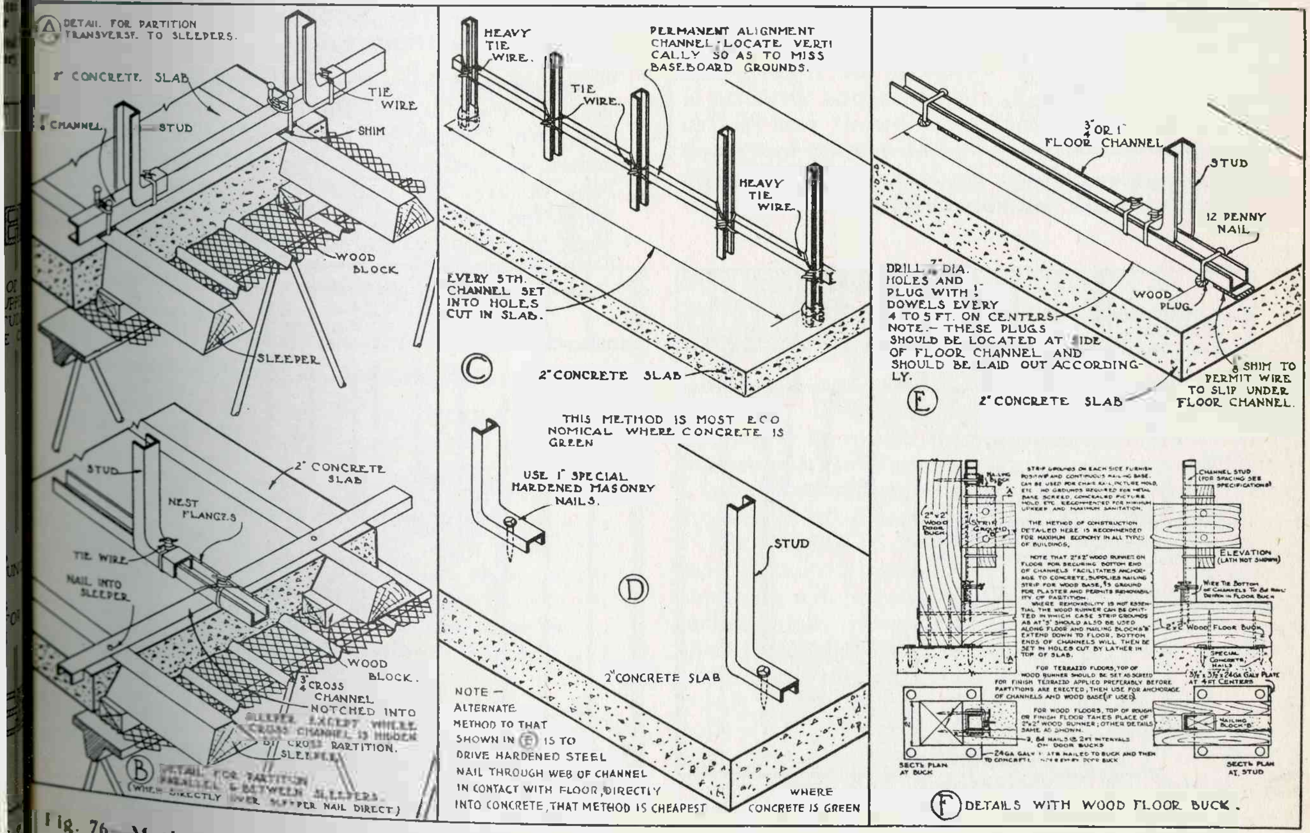

Ⓐ DETAIL FOR PARTITION TRANSVERSE TO SLEEPERS.
2" CONCRETE SLAB
CHANNEL
STUD
TIE WIRE
SHIM
WOOD BLOCK
SLEEPER
STUD
2" CONCRETE SLAB
NEST FLANGES
TIE WIRE
NAIL INTO SLEEPER
WOOD BLOCK.
3/4" CROSS CHANNEL NOTCHED INTO SLEEPER EXCEPT WHERE CROSS CHANNEL IS HIDDEN BY CROSS PARTITION.
SLEEPER
Ⓑ DETAIL FOR PARTITION PARALLEL & BETWEEN SLEEPERS. (WHEN DIRECTLY OVER SLEEPER NAIL DIRECT)
HEAVY TIE WIRE.
PERMANENT ALIGNMENT CHANNEL: LOCATE VERTICALLY SO AS TO MISS BASEBOARD GROUNDS.
TIE WIRE.
HEAVY TIE WIRE.
EVERY 5TH. CHANNEL SET INTO HOLES CUT IN SLAB.
Ⓒ
2" CONCRETE SLAB
THIS METHOD IS MOST ECONOMICAL WHERE CONCRETE IS GREEN
USE 1" SPECIAL HARDENED MASONRY NAILS.
STUD
Ⓓ
2" CONCRETE SLAB
NOTE — ALTERNATE METHOD TO THAT SHOWN IN Ⓔ IS TO DRIVE HARDENED STEEL NAIL THROUGH WEB OF CHANNEL IN CONTACT WITH FLOOR, DIRECTLY INTO CONCRETE, THAT METHOD IS CHEAPEST WHERE CONCRETE IS GREEN
3/4" OR 1" FLOOR CHANNEL
STUD
12 PENNY NAIL
WOOD PLUG
DRILL 7/8" DIA. HOLES AND PLUG WITH 1" DOWELS EVERY 4 TO 5 FT. ON CENTERS
NOTE.— THESE PLUGS SHOULD BE LOCATED AT SIDE OF FLOOR CHANNEL AND SHOULD BE LAID OUT ACCORDINGLY.
1/8 SHIM TO PERMIT WIRE TO SLIP UNDER FLOOR CHANNEL.
Ⓔ
2" CONCRETE SLAB
NAILING BLOCK "B"
2"x2" WOOD DOOR BUCK
STRIP GROUND "C"
STRIP GROUNDS ON EACH SIDE FURNISH POSITIVE AND CONTINUOUS NAILING BASE. CAN BE USED FOR CHAIR RAIL, PICTURE MOLD, ETC. NO GROUNDS REQUIRED FOR METAL BASE SCREED, CONCEALED PICTURE MOLD ETC. RECOMMENDED FOR MINIMUM UPKEEP AND MAXIMUM SANITATION.
THE METHOD OF CONSTRUCTION DETAILED HERE IS RECOMMENDED FOR MAXIMUM ECONOMY IN ALL TYPES OF BUILDINGS.
NOTE THAT 2"x2" WOOD RUNNER ON FLOOR FOR SECURING BOTTOM END OF CHANNELS FACILITATES ANCHORAGE TO CONCRETE, SUPPLIES NAILING STRIP FOR WOOD BASE, IS GROUND FOR PLASTER AND PERMITS REMOVABILITY OF PARTITION.
WHERE REMOVABILITY IS NOT ESSENTIAL THE WOOD RUNNER CAN BE OMITTED IN WHICH CASE STRIP GROUNDS AS AT "C" SHOULD ALSO BE USED ALONG FLOOR AND NAILING BLOCKS "B" EXTEND DOWN TO FLOOR. BOTTOM ENDS OF CHANNELS WILL THEN BE SET IN HOLES CUT BY LATHER IN TOP OF SLAB.
FOR TERRAZZO FLOORS, TOP OF WOOD RUNNER SHOULD BE SET AS SCREED FOR FINISH TERRAZZO APPLIED PREFERABLY BEFORE PARTITIONS ARE ERECTED, THEN USE FOR ANCHORAGE OF CHANNELS AND WOOD BASE (IF USED).
FOR WOOD FLOORS, TOP OF ROUGH OR FINISH FLOOR TAKES PLACE OF 2"x2" WOOD RUNNER; OTHER DETAILS SAME AS SHOWN.
3, 8d NAILS @ 2 FT INTERVALS ON DOOR BUCKS
24GA GALV PLATE NAILED TO BUCK AND THEN TO CONCRETE
CHANNEL STUD (FOR SPACING SEE SPECIFICATIONS)
ELEVATION (LATH NOT SHOWN)
WIRE TIE BOTTOM OF CHANNELS TO 8d NAIL DRIVEN IN FLOOR BUCK
2"x2" WOOD FLOOR BUCK
SPECIAL CONCRETE NAILS
3½" x 3½" x 24GA GALV PLATE AT 4 FT CENTERS
NAILING BLOCK "B"
SECT'L PLAN AT BUCK
SECT'L PLAN AT STUD
Ⓕ DETAILS WITH WOOD FLOOR BUCK.

Fig. 76—Methods Commonly Used for Anchoring Channel Studs to Thin Concrete Floor Slabs especially for steel joist and pan system floors. (See text).

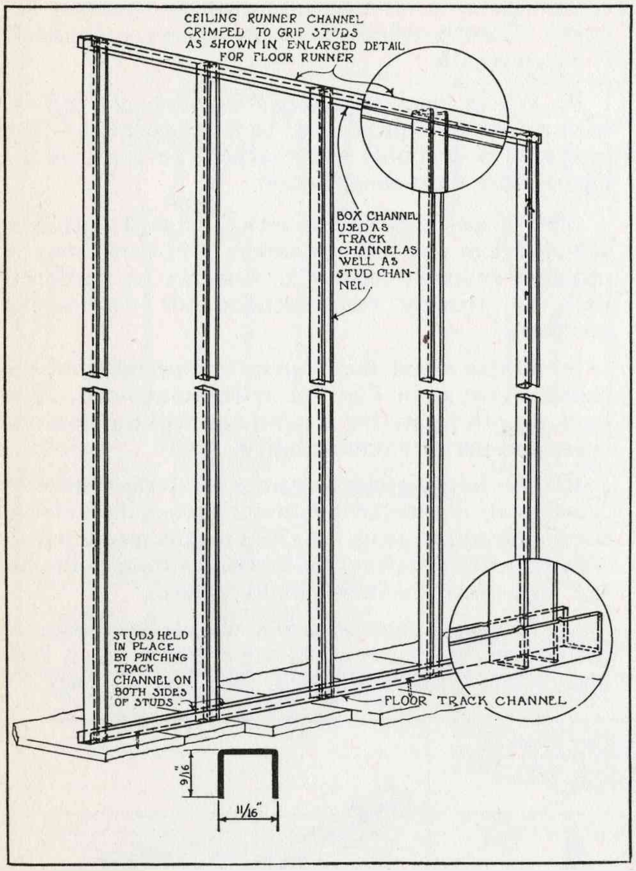

CEILING RUNNER CHANNEL CRIMPED TO GRIP STUDS AS SHOWN IN ENLARGED DETAIL FOR FLOOR RUNNER
BOX CHANNEL USED AS TRACK CHANNEL AS WELL AS STUD CHANNEL.
STUDS HELD IN PLACE BY PINCHING TRACK CHANNEL ON BOTH SIDES OF STUDS
FLOOR TRACK CHANNEL
9/16
11/16"

Fig. 77—Track Channel at Floor and Ceiling for Alignment and Rapid Erection.

Concrete Floors, Metal Lath Ceilings—Permanent Partitions:

(a) For anchoring the bottom of studs in construction any of the foregoing details ma used. For the top of the partition, although builders prefer a ceiling runner as in Fig. 74A, 68, the construction shown at top of Fig. 73B, 68 and Fig. 74B, Page 68, without ceiling runn in wide use and entirely satisfactory.

In Steel Joisted or Beam Construction with Concrete Finished Floors—Permanent Partitions:

Fig. 76 shows methods commonly used and f to be economical. For anchorage at top the in (2) above should be used except that a ce runner attached to the underside of ceiling required as in Fig. 74A, Page 68, when no ce lath is used. See also Fig. 74B, Page 68 and 75A, Page 68.

For Clay Tile Floor Construction—Permanent Partitions:

See details in Fig. 75B, Page 68.

Concrete Floors—Fireproof and Corridor Partitions:

Where building codes do not permit partitio rest on wood any of the details mentioned in preceding, excepting those showing wood bucks, are permissible. For maximum stabili case of fire, the upper ends of studs shou anchored into the underside of the masonry ce slab, and two-piece studs should be used.

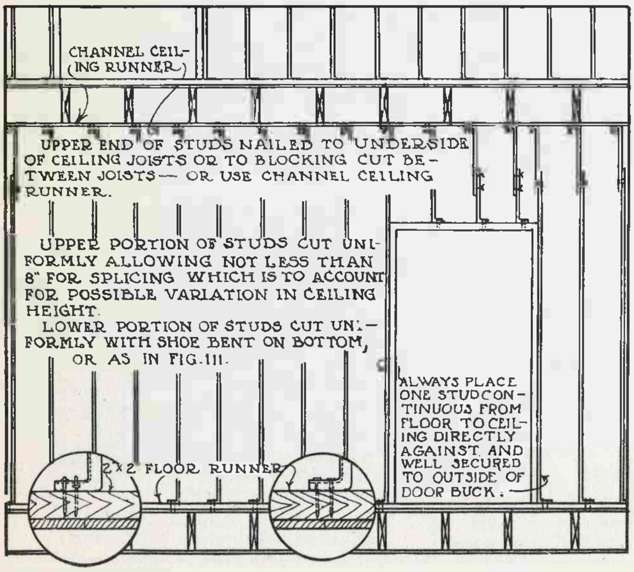

CHANNEL CEILING RUNNER
UPPER END OF STUDS NAILED TO UNDERSIDE OF CEILING JOISTS OR TO BLOCKING CUT BETWEEN JOISTS— OR USE CHANNEL CEILING RUNNER.
UPPER PORTION OF STUDS CUT UNIFORMLY ALLOWING NOT LESS THAN 8" FOR SPLICING WHICH IS TO ACCOUNT FOR POSSIBLE VARIATION IN CEILING HEIGHT.
LOWER PORTION OF STUDS CUT UNIFORMLY WITH SHOE BENT ON BOTTOM, OR AS IN FIG. 111.
ALWAYS PLACE ONE STUD CONTINUOUS FROM FLOOR TO CEILING DIRECTLY AGAINST AND WELL SECURED TO OUTSIDE OF DOOR BUCK.
2×2 FLOOR RUNNER

Fig. 78—Solid Partitions in Wood-Joisted Building—Ceiling Joists Perpendicular to Partition.

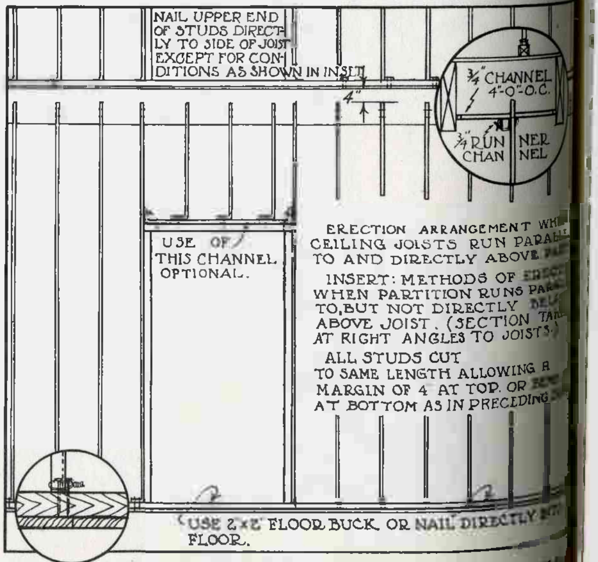

NAIL UPPER END OF STUDS DIRECTLY TO SIDE OF JOIST EXCEPT FOR CONDITIONS AS SHOWN IN INSET
4"
3/4" CHANNEL 4'-0"-O.C.
3/4" RUNNER CHANNEL
USE OF THIS CHANNEL OPTIONAL.
ERECTION ARRANGEMENT WH CEILING JOISTS RUN PARAL TO AND DIRECTLY ABOVE
INSERT: METHODS OF WHEN PARTITION RUNS PA TO, BUT NOT DIRECTLY ABOVE JOIST. (SECTION TA AT RIGHT ANGLES TO JOISTS.)
ALL STUDS CUT TO SAME LENGTH ALLOWING A MARGIN OF 4" AT TOP. OR AT BOTTOM AS IN PRECEDING
USE 2×2 FLOOR BUCK OR NAIL DIRECTLY FLOOR.

Fig. 79—Solid Partitions in Wood-Joisted Bui Ceiling Joists Parallel to Partition.

Concrete Floors—Removable Partitions—Wood and Steel Floor and Ceiling Buck:

Instead of letting the ends of the studs project into the masonry, wood bucks are used so as to facilitate removal of the partition and relocating in another place. See details at bottom of Fig. 73B, Page 68, also Fig. 74B. A ceiling buck concealed by a cornice mold is also used under masonry floors. The same method is also shown at the top of Fig. 75A, Page 68. where a steel joist floor system is illustrated. Besides removability, another important advantage which makes the wood buck useful even where alteration possibilities are not important is that it provides excellent nailing for the wood base, and being two inches thick eliminates the need for plastering grounds. Attention is also called to the complete details of Fig. 76F, Page 69. These also are economical whether removability is desired or not.

Channel floor and ceiling runners used in conjunction with stud shoes have also been found very satisfactory for partition construction subject to change of location.

For Better Sound Insulation:

Where a high degree of sound insulation is desired between rooms, architects should specify the channel studs to run all the way to the underside of the floor slab above, instead of stopping at the metal lath ceiling, the partition to be plastered up to the floor slab as a cut-off, so that noise cannot be transmitted by means of sound waves set up in the plastered ceiling. Two-piece studs are recommended for such construction. For still greater sound insulation, studs should rest on and ends be wrapped in felt or cork pads. These details are recommended for music studios, sound-film studios, etc.

Attachment to Wood Floors and Joists:

In Figs. 78 and 79, Page 70, are shown details for erecting the channel studs in wood joisted buildings. Probably the speediest method of erection is to drive two 3″ nails into the floor where a stud is to be erected, slip the channel between, and wrap a tie wire around it and wire to the nails. Another simple scheme is to bend a 2½-inch shoe on the channel stud and drive a nail through it into the rough flooring or floor buck as the case may be, or a nail can be driven on each side of the shoe and bent over.

Studs for Hollow and Double Metal Lath Partitions:

Any of the methods shown in the preceding are adapted for use with hollow metal lath partitions, using either wide single studs or double rows of ordinary channels. For double partitions used for sound resistance additional sound insulation is obtained by placing ends of channels in felt-lined slots or on cork strips, or putting sound-deadening materials under runners where they rest on floor or against ceiling.

Provisions for Compressed Air or Electric Power for Cutting Holes Reduce Erection Costs on Large Jobs:

Punching of holes in masonry for placing of studs is the most tedious and expensive part of lath erection. Therefore, when this method of erection is to be used it is urged that on large jobs arrangements be made to provide either compressed air or electricity for operating pneumatic or portable electric drills. This is specially advantageous when the concrete has set hard. On small jobs and where the concrete is green an ordinary cold chisel or star drill and hammer will do.

No Need for Bolting Any Part of Construction to Floors or Ceilings:

Metal lath and plaster partitions depend less upon the manner in which the metal is attached together than upon the plaster which cements the partition and gives it the necessary rigidity when set. This is perfectly apparent from the number of successful details here shown for attaching channel studs to floors and ceilings and in which bolting is not at all necessary. Architects are urged for economy's sake to embody these details in their specifications.

Size and Weight of Channel Studs for Solid Partitions of Various Heights and Thicknesses:

Over 90 per cent. of all partitions are under 12 feet clear in height and for these the standard ¾-inch cold rolled channels used in 2-inch solid plaster partitions are found amply strong and rigid. Channels of this size and weight are customarily stocked in all places where metal lath is sold.

For heights of 14 ft. the partition, although it may be built 2 inches thick with ¾-inch cold rolled channels, will be found more satisfactory if built 2¼ inches thick. However, if a 1-inch channel is used the 2-inch thickness is satisfactory for 14 ft. heights.

Although numerous instances are on record where 2-inch partitions over 20 feet in height have been built with ¾-inch channels it will be found advisable for speed of erection and to simplify bracing to use larger and stiffer channels when carrying partitions to such heights and the thickness of partition is also usually increased. See Table 2, Page 72.

TABLE 2—SIZE OF CHANNELS AND THICKNESS OF PARTITION FOR VARIOUS HEIGHTS OF SOLID PARTITIONS

Height not to exceed	Thickness or Partition	Size of Channels (Cold Rolled)
9 ft.	2 in.	¾ in.
12 ft.	2 in.	¾ in.
14 ft.	2 in.	1 in.
14 ft.	2¼ in.	¾ in.
16 ft.	2¼ in.	1 in.
18 ft.	2½ in.	1 in.
20 ft.	2¾ in.	1 in.

Note: ¾ inch hot rolled channels may be used in 2-inch partitions up to 14 ft. in height, 2¼-inch partitions—18 ft. high. 1-inch hot rolled channels may be used in 2⅛-inch partitions up to 16 ft. high, 2¼-inch partitions—18 ft. high, 2½-inch partitions 20 ft. high.

No limitations on length of these partitions for heights less than 12 feet. Length, between columns, walls or other vertical structural members, shall not be greater than two times the partition height when the latter is 12 feet or more, nor greater than one and one-half times the height when the latter exceeds 16 feet. For lengths exceeding these, thickness shall be increased 20 per cent.

For heights over 20 ft. furnish horizontal cold rolled channel or rod stiffeners on channel side of partition every 5 ft. vertically.

Cold Rolled vs. Hot Rolled Channels:

Either cold or hot rolled channels may be used for studs. In some sections of the country, hot rolled channels are used, but in most localities cold rolled channels are preferred. This is because cold rolled channels weigh less, are easier to handle, and can be more readily bent to form or cut to length. The fact that they usually cost less is also in their favour. Cold rolled channels of an equal size can be used for most positions where hot rolled channels are specified. In places where the channels are exceptionally widely spaced or used in high partitions the hot rolled channel, because of its greater stiffness, will be more economical, but in general, because of insufficient demand, the manufacturers of metal lath do not furnish them except on special order.

Channel Studs Are Placed Slightly Off Centre of Partition in 2-inch Partitions:

A glance at Fig. 72, Page 67, shows that the three-quarters inch channel studs are placed ⅛-inch off centre in 2-inch solid metal lath and plaster partitions. This provides three-quarter inch of plaster on the lath side of the partition. The other side of the channel at the extreme point is covered about one-half inch, but the lath on this side is so fully embedded with 1¼ inches of plaster that the construction is extremely well devised for greatest rigidity and permanence.

Because of thus off-setting the studs it is well to bear this in mind when drilling holes for them in floor bucks and elsewhere. For thicker solid partitions the studs are placed on the centre line.

Spacing, Placing and Bracing of Channel Studs—Solid Partitions:

It is generally accepted that where the metal is fully embedded as in solid plaster partitions t the lath is primarily a vehicle for the applicat of the plaster until it has set. The studs in co junction with the solid plaster possess all neces rigidity and strength as non-bearing partitions, lath being valuable additional reinforcement to p vent plaster cracks such as frequently occur in ot types of partitions. Therefore, the distance tween channels is governed by the stiffness of lath necessary to facilitate plastering. When lath gives too much under the trowel the work the plasterer is slowed up, but it is also possible place channels so close together as to add unnec sarily to the expense both for materials and erect

Because of the difficulty experienced in prope embedding ⅜-inch rib lath or sheet lath when u with ¾-inch channel studs, in a partition less th 2¼ inches thick, it is strongly urged that archite do not specify them except for partitions 2¼ inc or more in thickness. For 2-inch partitions b results and greatest economy are obtained using or flat-rib laths.

Experienced plastering and lathing contract know the spacings necessary to secure great economy for the completed job and hence shou be given discretion as to which combination lath and spacings to use, but the spacings sho not exceed those given in the table:

Studs and Spacings for Hollow Metal Lath Partitions:

For hollow partitions a double row of channels either cold or hot rolled with separato which also act as stiffeners, every two feet tically between opposite pairs, is standard co struction. Built in this manner they can be u for heights as great as 30 feet depending on de and length of partition. See Table III.

TABLE III—PERMISSIBLE HEIGHTS OF HOLLO NON-BEARING STUD PARTITIONS

Type	Face to Face Plaster Thickness	Maxim Heigh
Double Row of ¾″ Channels[2]	3	18
Double Row of ¾″ Channels[2]	4	24
Double Row of ¾″ Channels[2]	5	30
Single Row of 1½″ Channels	3	18
Single Row of 2″ Channels	3½	20
Single Row of 3″ Channels	4½	26
Single Row of 4″ Channels	5½	32

[1] For lengths not exceeding one and one-half times heig for lengths exceeding this reduce height 20 per cent.

[2] A ¾-inch horizontal stiffener channel with web horiz should be placed every 4 to 6 feet horizontally for all dou row channel partitions more than 10 feet long and more th 9 feet high. These stiffeners to be placed on inside of partit and to remain permanently tied to studs on at least one s of partition.

Spreaders come in various lengths to accommodate various thicknesses of partitions up to about 6 inches and are supplied by all lath manufacturers. New separating devices now available clip the channels together very rapidly. For deeper partitions requiring separators larger than 6 inches, spreaders are made of short lengths of channel. These are easily made on the job. They are bent up at both ends and the ends wired to each of the pair of channels. In this manner partitions or chases up to 30 inches deep are erected quickly and economically.

Horizontal Reinforcing for Long Partitions:

For partitions of the hollow type more than 10 feet high, or of lesser heights, when more than 10 feet long, a ¾-inch horizontal stiffener channel should be placed every 4 to 6 feet horizontally on the inside of the partitions securely tied to the channels and remain as a permanent reinforcement.

Hollow Partitions Formed With Sheet Metal Studs:

For economy and speed of construction the use of sheet metal studs is recommended. These studs are made usually from 18 gauge steel in the form of a channel of the size required. The flanges are formed 1 inch deep and punched with ¼-inch holes at 3-inch centres to facilitate attachment of the metal lath.

These studs are usually erected by attaching a 24-gauge runner channel or track to floor and ceiling with concrete nails, into which are inserted the studs and secured solidly to runners.

Stud Spacings Along Face of Partition:

The spacing of studs along the face of hollow partitions is governed by the stiffness of lath between supports, as in solid partitions.

Soundproof Double Metal Lath Partitions:

For these a double row of standard ¾-inch channel studs 12 inches on centre are recommended. Cross braces or separators, connecting the rows on opposite sides, are not used because they help transmit sound, therefore the studs are reinforced where necessary by 1-inch horizontal channels placed with the web horizontal in the hollow space and wired permanently to the studs. These stiffeners may be omitted for partitions under 8 ft. high, but are recommended for best results where rigidity is essential and should in every case be used for partitions more than 8 feet high and for those over 10 feet long.

Independent sets of horizontal channels are used for each row of studs and should be spaced not to exceed 4 feet on centre vertically at least two being provided for partition 9 feet 6 inches high or over. They should be placed so that no part comes in contact with any part of the partition on the opposite side and so they touch no conduits, service piping, ducts or similar construction which would function as a source or carrier of sound. See Fig. 30, Page 20.

The distance between faces of these soundproof partitions depends on the size of conduits or piping, if any, which are to be enclosed therein. If nothing is to be placed in the hollow space the out to out distance can be made as small as 4¼ inches, and this will also accommodate horizontal runs of conduit without increasing the depth of the partition. Where vertical runs of conduit or service piping, etc., are to be accommodated their outside diameter should be added to the 4¼-inch minimum above to determine face to face of plaster depth of partition. It is important to note that increasing the spread between the faces of these partitions does not affect the weight of the partition in the least.

Additional Reinforcing for Long Partitions:

For partitions of this type more than 8 ft. high when exceeding 10 ft. in length, such as for corridors, school rooms, etc., and especially where impact stresses may be expected, ¾-inch channels should be placed vertically in the hollow space, from floor to ceiling every 10 feet along the partition to reinforce the horizontal stiffening channels previously referred to.

These intermediate vertical stiffeners should be staggered for the two sides of the partition so they make no contact with any of the construction on the opposite side. They should be securely tied to both the horizontal channel and the stud opposite which they are located. The depth of those vertical stiffening channels when used should be added to the 4¼-inch minimum depth mentioned previously to determine the plaster to plaster outside thickness of partitions.

Temporary Bracing and Aligning of Metal Studs:

All types of non-bearing metal lath partitions, after studs are in position, are temporarily braced in order to insure a stiff, straight wall for the correct application of lath, grounds, conduits, etc.

This brace is very simple and easily applied. Usually it is a ¾-inch channel placed horizontally midway between floor and ceiling and wire tied to each of the studs. (See Fig. 80.) If the distance from floor to ceiling is more than 12 feet, additional braces are supplied so that the distance between does not exceed 6 feet. The brace is kept in place until after the scratch coat of plaster on the lath

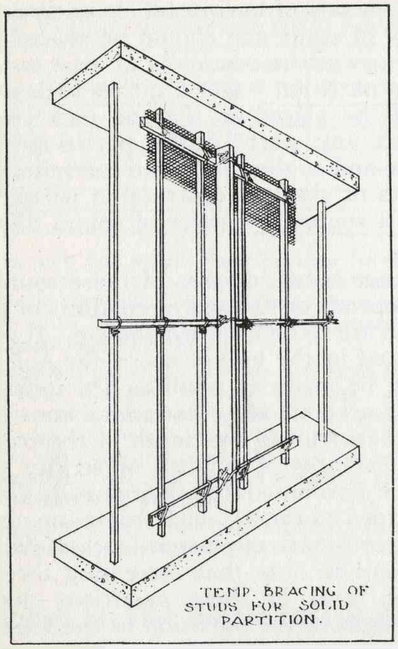


Fig. 80—Temporary Bracing Using Vertical Stiffener to Provide Cleared Working Space.

side has set when it is permanently removed permit placing the backing-up coat on the chan side. On long or high partitions additional brac diagonally from the floor or ceiling to the horizont bracing is provided.

Where solid partitions are thicker than 2½ inche it is frequently economical and makes a strong wall to permit the horizontal bracing to rema and be permanently embedded. Such stiffening provided in the specifications for long and hi hollow and double partitions.

Many lathers prefer other types of bracin Wood is quite frequently used, 2 by 4's displaci the ¾-inch channels previously described, a typic method being shown in Fig. 70, Page 65. Whe space for diagonal braces is scarce, vertical bra as shown in Fig. 80 are recommended. They hav the further advantage of providing a clear spa for the workmen of other trades.

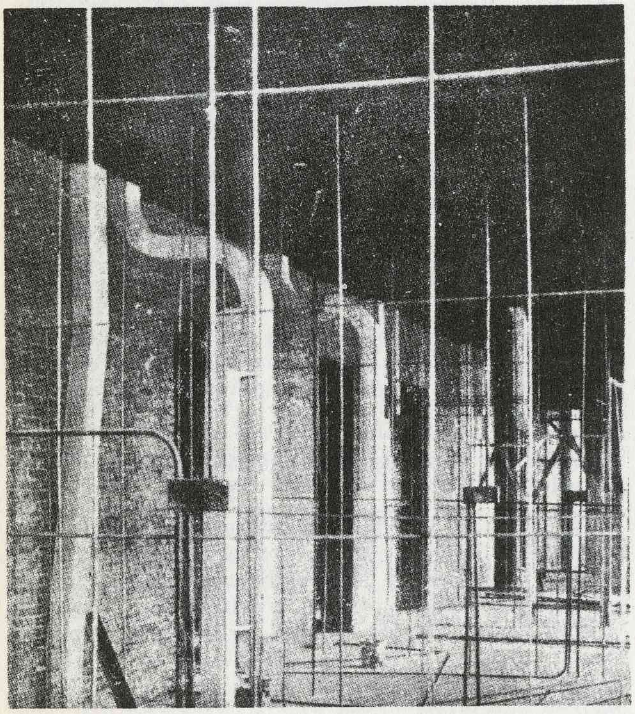


Fig. 81—Vertical and Horizontal Conduit and Boxes in 2-inch Solid Metal Lath Partitions.

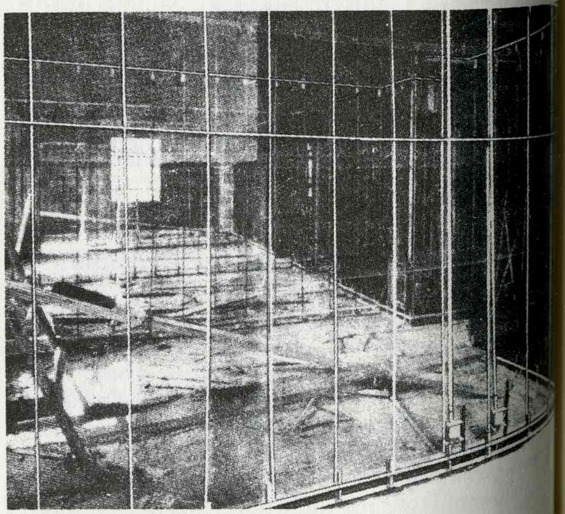


Fig. 82—Simplicity of Installation of Rigid Con Outlet Boxes, Also Showing Henderson System Grounds.

Section No. III Part "E"

Erection of Metal Lath

The skill of experienced lathers in applying metal lath is nothing short of marvelous. Lathing is done very rapidly and in a few days' time 3 or 4 men will have erected studding and completed lathing for several hundred yards of partitions. Lathers quickly adapt their work to accommodate plumbing, wiring, heating and other service piping with much less difficulty because of the flexibility of metal lath construction than is possible when other types of partitions are used. Examples of lathing will be found illustrated throughout this book, attention being called especially to Fig. 82, Page 74 and Fig. 83.

For Economy, Lathing Should be Started at Top of Partition:

With the conduit and service piping in place, the partition is ready for the application of metal lath.

It is best to start lathing at the top of the partition. By starting at top any special cutting to width will be left for the portion near the floor where it is more easily done than on the scaffold. Secondly, to facilitate plastering the upper edge of the lower sheet should preferably lap over the lower edge of the upper—and this is most easily accomplished by applying the first sheet at the top of the partition. Furthermore, as scaffolding is necessary for attachment of upper end of studs to ceilings it will be available when application of lath is started at top, and, with lathing on upper part of partition completed, scaffold can be moved to another partition while the tying gang is free to finish the bottom lathing.

Details of Application of Lath for Solid Partitions:

For solid partitions only one metal lath surface is used. The lath is placed on the face of the channel which has been set back as explained. Sheets are applied to one side only of the channels with the long dimension of sheet across the studs and with ends of sheets staggered one above another. As noted above, lathing is commenced at the top of the partitions and carried down with the edge of the lower sheet lapping over the upper.

Corner Laps and Corner Strips:

Where the ceiling is plastered directly on tile or other masonry, and in general if metal lath is not used on the ceiling, a 4-inch corner lap or shoe is bent on the upper edge of the top sheet and attached to the ceiling with masonry nails or staples so that no joints occur at juncture of ceiling and partition. Similarly, all lath should be started one stud away from corner and be bent into the angle and carried on to the abutting wall so as to avoid a joint at juncture of walls. However, where a rib

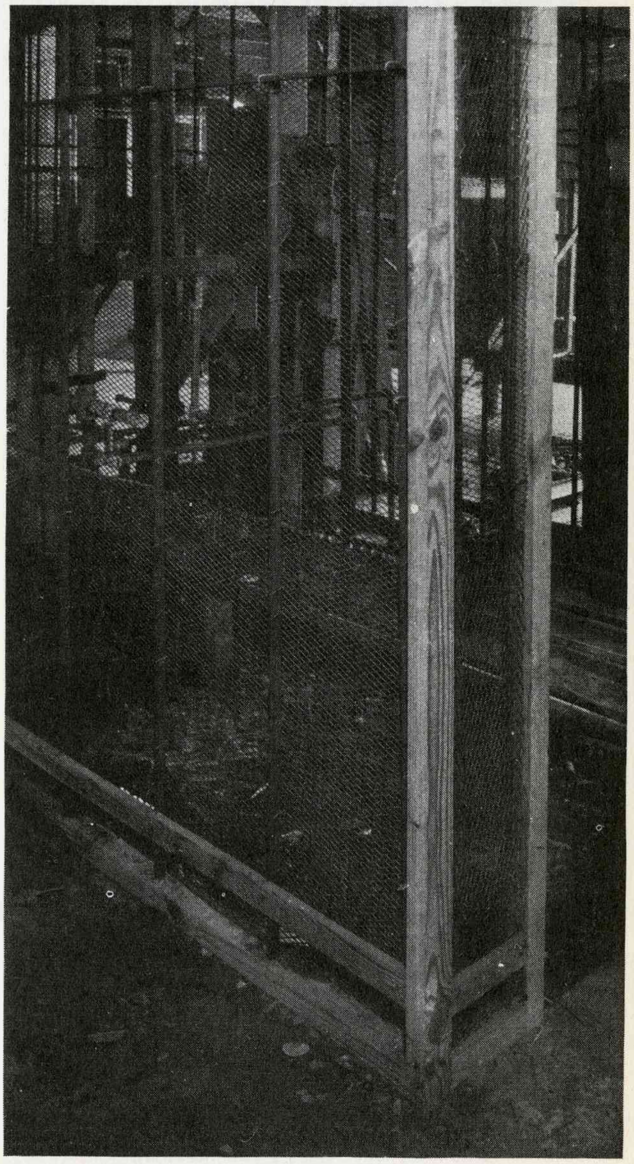


Fig. 83—Erection Details, Corridor Left Foreground, Bathroom in Rear.

stiffened or sheet lath is used on partitions, instead of bending it, the end is butted into the corner against the ceiling lath and adjoining walls, and corner strips are used to reinforce the joints. These, sometimes called Cornerite are of flat lath 6 inches wide bent into the shape of an "L" making each leg 3 inches wide and securely wired along each edge in all corners. Cornerite should not be fastened at the corner, but only along each edge of the sheet.

Wire Ties and Lapping of Sheets:

Sheets are attached by means of No. 18 gauge annealed wire, galvanized for protection, or by suitable clips. For nailed-on work 1¼-inch large head nails are used. Sheets are tied at 6-inch intervals along studs and a tie also placed where sides of sheets lap at channels. A tie should also be placed on side laps half way between channels to facilitate plastering. The ordinary "butterfly twist" of the lather is given to the end of the wire tie and this secures it permanently to the studs.

Flat expanded metal lath should be lapped at sides not less than ½ inch and at ends not less than 1 inch. End laps of sheets should generally occur only over studs; if between studs, the laps should be securely laced with tie wire. Rib and sheet laths are lapped at sides by nesting outside ribs or selvage. At ends rib-lath is lapped 1 inch. End lapping of sheet-laths is done by lapping one series of loops and nesting tops and bottoms of loops of lapping sheets.

In Solid Partitions Proper Choice of Side of Channels on Which to Apply Lath in Series of Adjoining Rooms, Expedites Plastering and Reduces Costs:

As lath is applied on one side only of channels in solid partitions the lather can frequently aid materially in expediting plastering and reduce co by applying the lath on that side of the chann which makes it possible to apply the plaster on four walls before the scaffolding is moved to ot rooms. In a series of adjoining rooms numbe 1 to 4 if the lath is applied on all four walls on t near side of the channel studs in alternate roo 2 and 4, all walls and ceilings in both rooms can scratch coated before moving the scaffold. Wh this plaster is setting, the plasterer will move rooms 1 and 3 and scratch coat the ceiling by whi time the scratch coat on the opposite side of t channel partitions in rooms 2 and 4 will have s Without loss of time he can then proceed to "flar in" the backing up or scratch coat on the chan side of the partition from bottom to top in the od numbered rooms. This done he next applies t brown coat on walls and ceilings in the even nu- bered rooms and then back to the odd number ones finishing each coat completely in each ser of rooms before moving scaffold.

If, on the other hand, lath has been placed discriminately on the studs without regard plastering procedure, one or two of the partiti walls will probably lag a coat behind the others ca ing loss of time or unnecessary moving of t scaffold.

Lathing on Hollow and Double Partitions:

For hollow and double partitions two metal la surfaces are applied—one for each face of t partition. Order of placing, methods of lappi and tying are the same as given for solid partitio with the exception that in the soundproof dou partition it is important that the wire ties be co fined to use around the channels and none be pe mitted to go around piping, conduits, etc., whi are carriers of sound. It is recommended that t point be inspected from time to time on every j of this kind.

Section No. III Part "F"

Grounds for Plastering and Trim

Grounds are employed either for the attachment of trim, or as alignment and thickness guides for the plasterer (such as metal screeds), or for both purposes.

The many facilities offered by metal lath and channel partitions, for the satisfactory attachment of all kinds of grounds and trim to them constitutes an important advantage in the use of this type of construction as compared with other partitions.

It is not necessary to drill or plug holes, use shims which usually split, or toggle bolts or other labourious and expensive devices for attaching grounds. Even after much careful drilling and plugging, the means of attachment to soft masonry block frequently work loose, making repairs difficult and expensive. On the other hand, the attachment of grounds to the channel studs stays firm and rigid and the relatively inexperienced carpenter quickly becomes adept in the simple methods used. The cost of erection, therefore, is frequently 50% less than for other partitions.

Strip Grounds:

The most commonly used ground for metal lath partitions is used for both screed and attachment of trim. It consists of a continuous horizontal wood strip from ⅜ to ¾-inch thick and 1⅝ inches wide, wire tied or otherwise secured to the studs and placed over the lath on the lath side with a companion strip placed against the channels on the opposite side.

This ground finishes flush with the wood door bucks at openings and with wood floor bucks when used. Such grounds are placed on each side of the partition at heights to take care of baseboard, chair rail, cornice mold, etc., as shown in Fig. 82, Page 74. In Fig. 90, Page 81, they are shown just above the floor, in conjunction with the wood floor buck. Note cut-out for base receptacle. For additional details showing use and location of strip grounds see Diagrams 1 and 4 of Fig. 94, Page 83.

As the studs are usually off centre in the 2-inch partition, the thickness of the grounds on the lath side should be about ⅝ or ¾ inch (depending on the thickness of the metal lath) and on the channel side ⅜ to ½ inch. In 2¼-inch and thicker partitions the studs are usually placed so that the same thickness of grounds is used both sides.

Attaching Grounds to Partition:

Strip grounds are usually merely tied to the channel studs, as in Fig. 84. If care has been exercised in aligning the latter when bracing during erection, or if the studs are secured to floor and ceiling by some of the methods which insure alignment, tying will give entirely satisfactory results. Alignment of the grounds can be improved by small wood shims.

A better method and the one recommended by the Associated Metal Lath Manufacturers is that shown in Fig. 84B. Short nailing blocks to correspond with width of channel, and 1-inch wide and 2 or 3 inches long are used between the strip grounds on either side, and the channel. These blocks are nailed to the channels before erection or clipped to the studs after erection. The grounds are nailed to these blocks by two carpenters, one on each side of the partition backing each others' blows, the nails being driven from one strip ground through the block into the other ground, then clinched. Where an especially good job is wanted, small wedges are used for alignment as shown in Figs. 84B and 85 between the strips and the channels or blocks. A fairly satisfactory job is also obtained with the blocks used only every second or third channel.

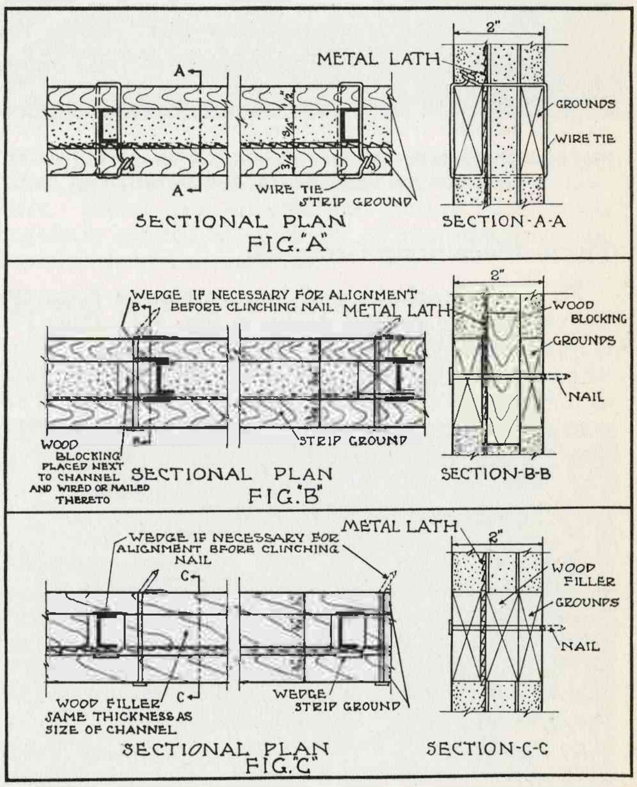


Fig. 84—Various Methods for Attaching Strip Grounds to Solid Metal Lath Partitions.

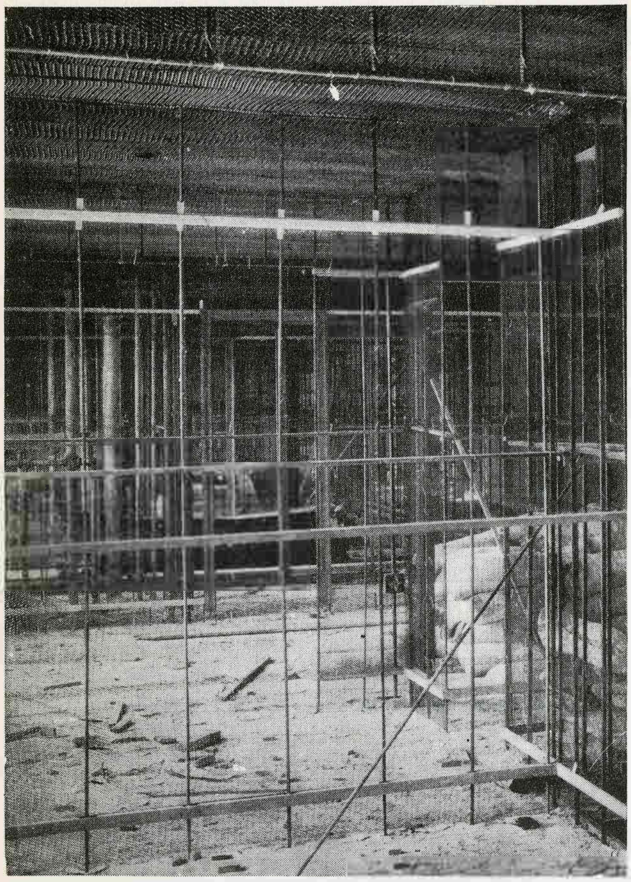


Fig. 85—Grounds for Picture Mould, See Detail Fig. 84-B. Grounds for Base-Board, See Detail, Fig. 84-C.

Three-Piece Strip Grounds:

For the attachment of heavy trim or fixtures, the three-piece ground shown in Fig. 84C, Page 77, is recommended. Instead of a nailing block, a continuous wood strip or block with thickness the same as depth of channel is cut between the studs. The continuous grounds on either side are nailed through this inner strip through to the other side.

Intermittent Strip Grounds:

For certain types of trim and also where an especially thin solid partition is wanted, grounds of the intermittent type are used. These are short strips cut in and set between the channels as shown in Fig. 87, Page 79, and staggered between alternate channels in order to permit nailing into the end of the ground. They are frequently used where a wide baseboard is specified and there is no wood floor buck or wood floor to nail to. The intermittent grounds shown in Fig. 87, Page 79, are used in combination with a continuous strip ground.

Wood Grounds on Hollow and Double Metal Lath Partitions:

For these partitions any of the details or devi described for grounds on solid partitions may used, excepting that where blocks are used a Fig. 84B, Page 77, a set is applied on each row channels. In wide single stud hollow partitions single wide block may be used on each chan For the soundproof partition it is important, prevent sound transmission, that no wire ties nails for the attachment of grounds be permitted run through to touch any part of the opposite ha of the partition.

Additional Details on Wood Grounds:

Other details of wood ground installation a shown in the Chapters on Trim.

Metal Base Screeds, Picture Mould and Corner Beads:

Metal base screeds or grounds are recommende for use when wainscots or bases of Portland cemen terrazzo, or similar materials are used and it desired for upkeep reasons or for appearance sa to have a line of demarcation between them a

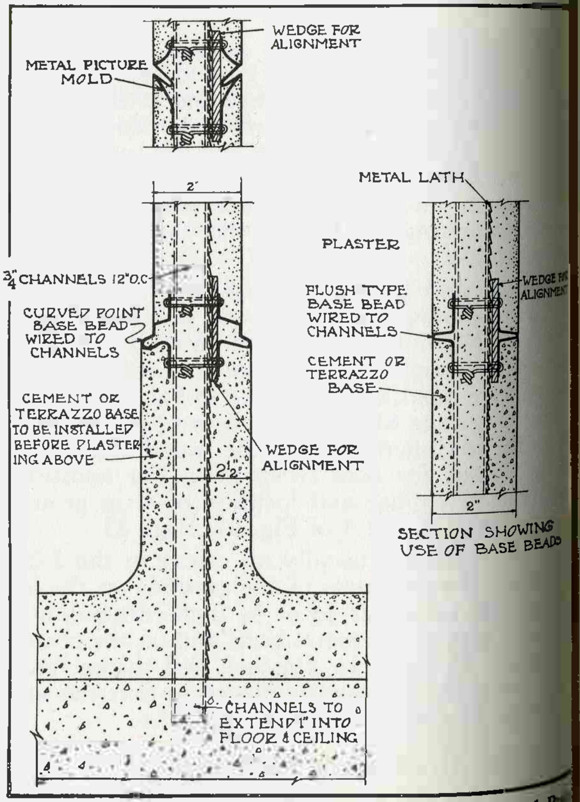

WEDGE FOR ALIGNMENT
METAL PICTURE MOLD
METAL LATH
2"
PLASTER
3/4" CHANNELS 12" O.C.
CURVED POINT BASE BEAD WIRED TO CHANNELS
FLUSH TYPE BASE BEAD WIRED TO CHANNELS
WEDGE FOR ALIGNMENT
CEMENT OR TERRAZZO BASE
CEMENT OR TERRAZZO BASE TO BE INSTALLED BEFORE PLASTERING ABOVE
WEDGE FOR ALIGNMENT
2½"
2"
SECTION SHOWING USE OF BASE BEADS
CHANNELS TO EXTEND 1" INTO FLOOR & CEILING

Fig. 86—Metal Picture Mould, Flush and Curved-P Base Beads (Also Called Screeds) Eliminate Separate Grounds.

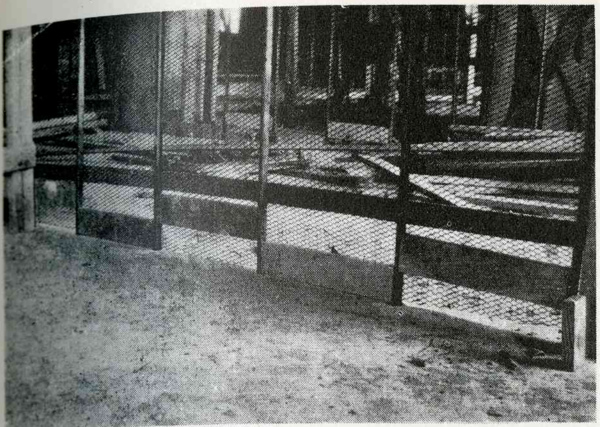


Fig. 87—Intermittent Strip Ground for Wide Baseboard.

the plaster above. The use of base screeds facilitate construction as they expedite the application of both the plaster and the terrazzo base for which they act not only as a dual ground, but also as a stopping point. They are specially adapted for use with metal lath partitions as the lather readily wire ties them to the regular channel studs, and screeds are erected more rapidly on metal lath than on any other type of construction.

Metal base screeds are stamped out of sheet steel and are of two types, flush and offset. Flush screeds are used where the plastering above and below finishes to the same line. See Fig. 86, Page 78. The offset type is employed for places where the plastering sets back from the base. Fig. 86, Page 78, also shows a section of a curved point base screed, being of the offset variety, showing use with plaster above and terrazzo base below. On the channel side of the partition the screeds are wired through holes in their flanges direct to the channels. On the lath side the screeds are lined up by using wedges against the studs.

Metal picture moulds of the concealed type are used and applied in the same manner as metal screeds. Their chief claim, likewise, is economy, as a separate wood ground is dispensed with since the moulds serve both for the hanging of pictures and as grounds for the plaster. They are inconspicuous in the wall, more sanitary than wood moulding, require no decorating, and offer maximum fire protection. See Fig. 86, Page 78. Holes are provided in the flanges of the metal mould to facilitate tying to the lath at regular intervals.

Corner beads are used both for corner protection and plastering grounds. Many types are available and all are attached more readily to the metal lath, because of its many openings, than to any other type of plastering base. A typical installation of corner bead and picture mould is shown in Fig. 88.

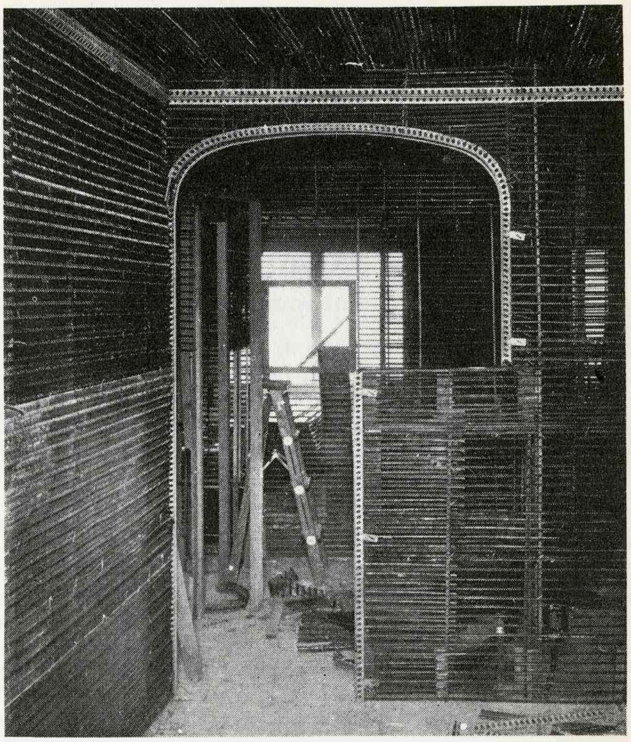


Fig. 88—Installation of Metal Picture Mould and Corner Bead.

For hollow and double partitions, the attachment of metal screeds and moulds is similar to that for solid partitions. The note on wire ties in soundproof partitions as given in this chapter also applies here. Metal base screeds, and picture moulds are regularly carried in stock by all manufacturers of metal lath and accessories.

General Note on Grounds:

Attention is called to the fact that with the exception of the special case shown in Fig. 87 the grounds are in every case applied after the lath is

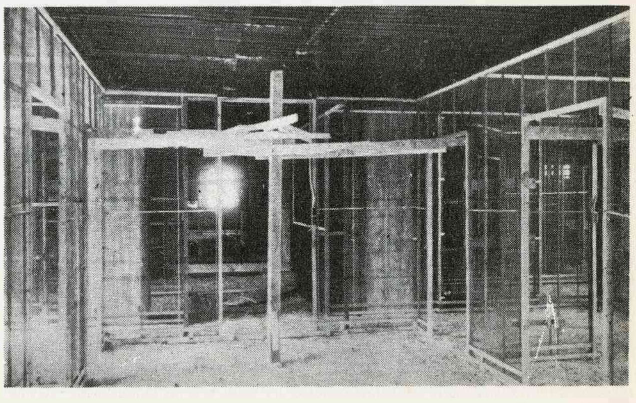


Fig. 89—Installation of Continuous Strip Grounds.

attached. This assures a continuous rigid plastering base at least expense, and a more satisfactory job than when the grounds are applied first and the lath is cut to fit around.

In any use of grounds or screeds it should be remembered that they serve primarily as guides to which the plasterer must work. If the finished plaster partition is to be perfectly straight, plumb, and of the required thickness, the grounds must be carefully aligned regardless of any irregularities in the studs and careful workmanship by the carpenter or other mechanic who applies the grou
should be insisted upon.

It is likewise difficult for the carpenter or sh
metal worker to do a good job hanging trim
the grounds are right. An uneven, springy,
aligned ground always leads to trouble. C
versely, the right ground will speed up the w
and hold down costs. It will therefore be wel
give the greatest care to the selection and appl
tion of grounds.

Section No. III Part "G"

Installation of Electrical Devices, Ducts, Etc.

NOTE: As the customary types of devices, outlets, etc., commonly used for masonry partitions finishing 3 inches or more in thickness are similarly installed in hollow and double metal lath partitions no special comments, on installations of electrical equipment in these partitions, are needed.

Electrical Products Manufacturers Now Provide Complete Line of Devices for 2-inch Partitions:

Modern convenience demands electrical service of the highest efficiency and the success of 2-inch solid metal lath partitions has been assured by the co-operation of manufacturers of electrical devices and fittings of all kinds who have placed on the market a complete line of devices which can be concealed in the thickness of the partitions. This eliminates a difficulty which architects had heretofore experienced.

With the co-operation of these manufacturers it is now possible to secure and install all types of electrical switches, convenience outlets, receptacles, and fixture outlets and boxes so that they are fully concealed with no greater difficulty than installation in any other type of partition.

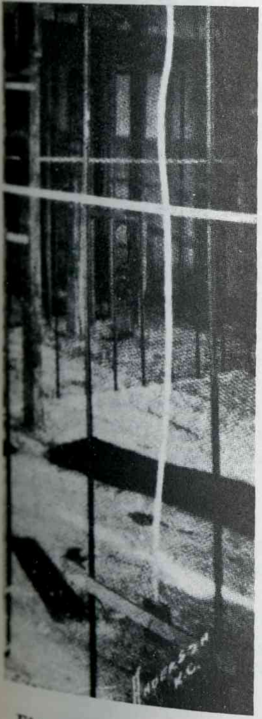


Fig. 92—Installation of Flexible Cable.

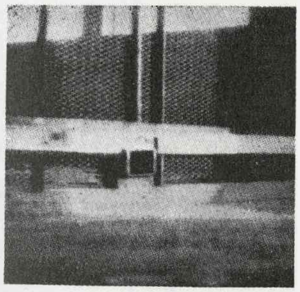


Fig. 90—Baseboard Outlet Serving Adjoining Rooms

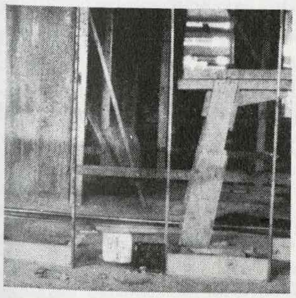


Fig. 91—Single Conduit Serves Adjoining Baseboard Outlets.

Metal Lath Offers Greater Facilities for Electrician:

As a matter of fact, the very nature of the metal lath partitions which require no expensive channeling, nor cutting away for installation of conduit as in block and tile partitions, makes the use of metal lath construction with its many opportunities for attaching fixtures securely, particularly advantageous from the standpoint of cost of electrical installation. Note that channeling of block partitions robs them of a large part of their sound resistance and stability.

Figures 81-82-90-91-92 show photographs of electrical installations in solid partition construction. Notice especially the straight and clean-cut job in Figures 81 and 82, Page 74.

Installation of Conduit and Cable:

Co-operation between lathing and electrical contractors so that the stub ends of conduit placed in floors, for running into partition later, are "spotted" accurately in the concrete floor forms instead of haphazardly, will result in having the conduit located well within the confines of the solid partition. Experience has shown that this difficulty is quickly remedied after the first installations in solid metal lath partitions and that thereafter installations are equally as rapid as in other types of construction. A "hickey" (a gas pipe bender for conduits) used on the stub end of a floor or ceiling riser not properly located will quickly bring it to the centre of the partition by a general ogee bend.

Installation of conduit is the next step after placing the channel studs and bracing them, and before lath is applied so that the conduit is usually

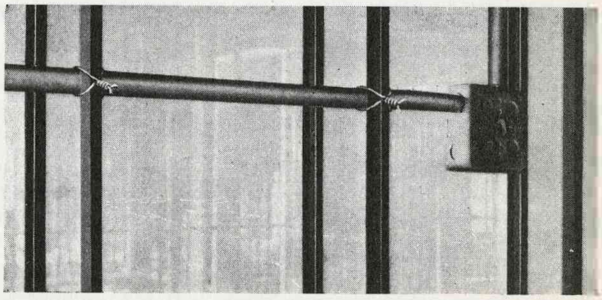


Fig. 93—Conduit and Outlet in Hollow or Double Metal Lath Partition.

wired to a temporary cross piece between the channels on either side. It is not necessary to locate the conduit up against a stud, as the metal lath reinforced plaster embraces the conduit all around in a permanent grip wherever located in the partition. Not only is the partition not weakened by the conduit, but the latter actually adds so much reinforcement to the construction.

Flexible cable is ordinarily tied where it crosses the channel studs or to the temporary partition bracing and the box to which it is connected is also usually tied to the construction. (See Fig. 92, Page 81.)

Switch boxes and convenience outlets are placed at the same time but are not firmly fixed until lath is applied when they are wired to it or channels so that the face of the outlet is properly located with respect to the finished plaster surface.

For convenience, electrical workers tie the box to the lath if it is in place. It is always recommended that when installed on the lath side of the partition, for which it is necessary to cut a hole in the lath, that a small piece of metal lath be wired to the back side of the box to provide a good bond for the plaster. See Fig. 94, Diagram 1, Page 83.

Oval-shaped Conduit Facilitates Horizontal Runs in 2-inch Shallow Partitions:

When running electrical service horizontally through the partition there is lack of depth over the channel studs to permit use of circular rigid conduit except in partitions 2½ or 2¾ inches thick. For this purpose oval-shaped conduit or armored cable is recommended in 2-inch partitions. This type of oval duct or cable is already sanctioned in a number of cities and undoubtedly will be adopted in others when brought to the attention of building officials.

Installation of Outlets—
Electrical Installation for Outlet On One Side of Partition Only:

The upper and right hand details in Diagram 1, Fig. 94, Page 83, show typical installations of a standard shallow outlet for a switch box, convenience outlet, or light fixture on one side of partition only.

Single Conduit Serves Multiple Outlets for Single or Adjoining Rooms:

Where a series of convenience outlets are to be placed side by side in a partition, manufacturers have provided boxes permitting the devices to be "ganged" so that a single conduit will serve all.

For economy and ease in wiring, it is frequently desirable to place fixtures back to back or side by side to serve rooms which adjoin so that a single conduit instead of two will be required. W
switch boxes or convenience outlets are loca
above the baseboard the simple detail show
Fig. 94, Page 83, Diagram 3, lower sketch, is
commended. Boxes face opposite, one is conne
to the supplying conduit and current is carrie
the others through a flexible cable connection.

Where outlets are located in the baseboar
number of installation methods are availabl
of the neatest and least expensive types is sh
in the lower left hand corner of Diagram 1, Fig
and in Fig. 90. It consists of an extension b
ring without back, placed approximately in
center of the partition with cover plates on
side to bring it out flush with the plaster or
as desired. As indicated in the diagram a si
conduit supplies the outlets to both sides.
cover plates are obtainable in various depth
suit conditions. The detail of Fig. 94, Page
Diagram 1, is not, however, designed for light
tures such as wall brackets, etc. (To prev
sound conduction the box should be stuffed wi
sound-absorber).

Fig. 91, Page 81, shows another simple and i
pensive method developed for this purpose.
boxes of equal size are placed side by side fron
in opposite directions and coupled with a stan
box connector. A single conduit coming up f
the floor and directly connected to one supp
both. The construction is also shown in Fig.
Page 83, in the upper detail of Diagram 3. Co
plates should be ordered for the thickness of t
struction at outlet.

Construction Details for Wiring Racew etc.:

In buildings, such as offices, in which change
occupancy are more or less frequent, it is hi
desirable to provide some convenient means
varying the wiring arrangements from time to ti
The raceway detail shown in Diagram 4 of Fig
Page 83, has been developed to show remo
baseboard in connection with both light and
phone circuits and method of carrying the
over door openings. The raceways permits tap
the service wiring at various points without cu
into the construction or providing new cond

Installation of Ducts, Piping, etc., Gre than 1-inch Outside Diameter Requires Th Solid or a Hollow or Double Partition:

Two-inch solid partitions are not intend
use where conduits, piping, ducts, etc., exce
1-inch in outside diameter are to be con
within the partition. A minimum coverag
½-inch of plaster is required and it is then
urged that where piping of greater diamete
be accommodated, that architects call for

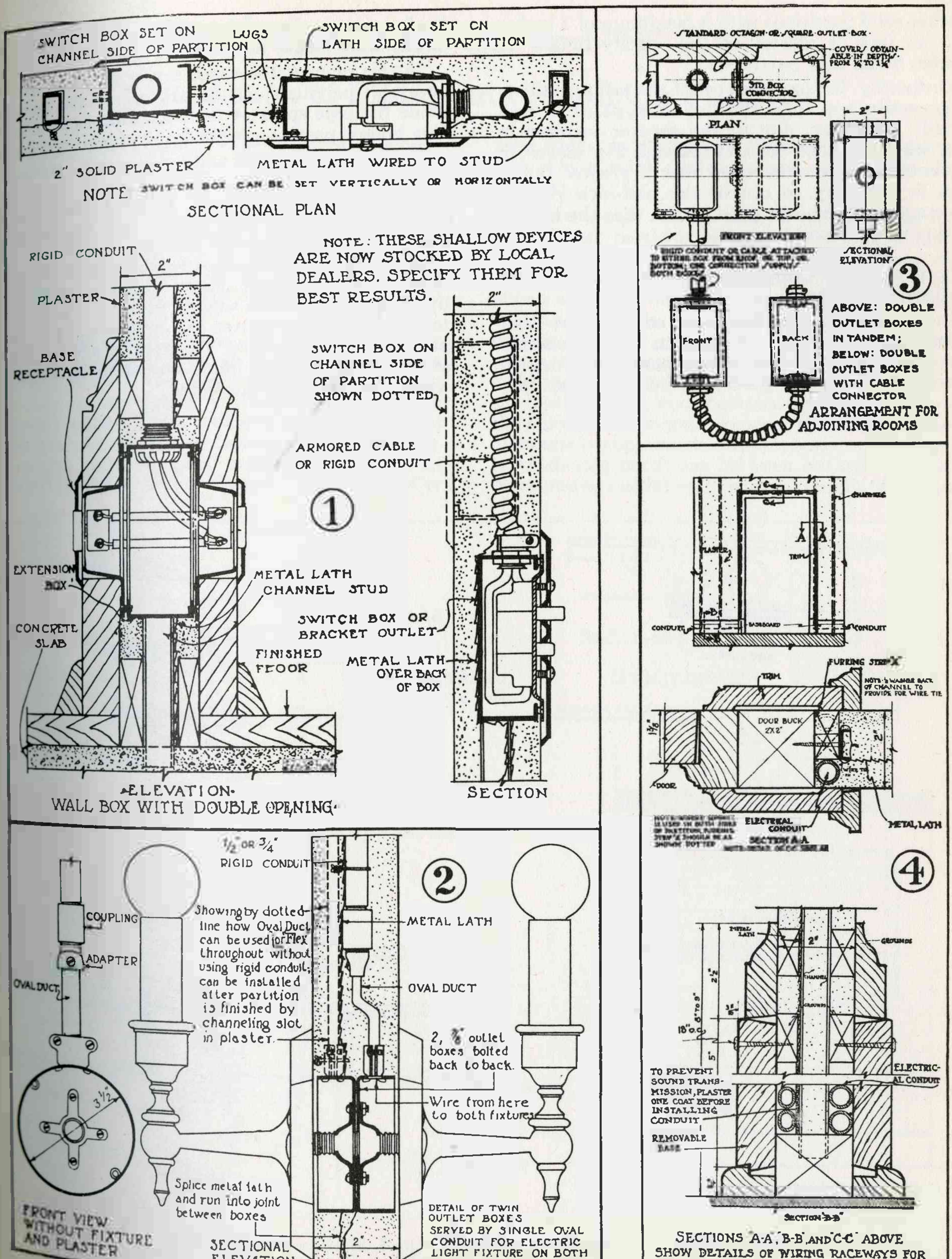

SWITCH BOX SET ON CHANNEL SIDE OF PARTITION
LUGS
SWITCH BOX SET ON LATH SIDE OF PARTITION
2" SOLID PLASTER
METAL LATH WIRED TO STUD
NOTE SWITCH BOX CAN BE SET VERTICALLY OR HORIZONTALLY
SECTIONAL PLAN
NOTE: THESE SHALLOW DEVICES ARE NOW STOCKED BY LOCAL DEALERS. SPECIFY THEM FOR BEST RESULTS.
RIGID CONDUIT
2"
PLASTER
BASE RECEPTACLE
EXTENSION BOX
CONCRETE SLAB
METAL LATH CHANNEL STUD
FINISHED FLOOR
·ELEVATION·
WALL BOX WITH DOUBLE OPENING·
SWITCH BOX ON CHANNEL SIDE OF PARTITION SHOWN DOTTED
ARMORED CABLE OR RIGID CONDUIT
①
SWITCH BOX OR BRACKET OUTLET
METAL LATH OVER BACK OF BOX
SECTION
·STANDARD·OCTAGON·OR·SQUARE·OUTLET·BOX·
·COVERS OBTAINABLE·IN DEPTHS·FROM ¼" TO 1¼"
STD. BOX CONNECTOR
·PLAN·
2"
FRONT ELEVATION
RIGID CONDUIT OR CABLE ATTACHED TO EITHER BOX FROM END, OR TOP, OR BOTTOM; ONE CONNECTION SUPPLIES BOTH BOXES
SECTIONAL ELEVATION
③
FRONT
BACK
ABOVE: DOUBLE OUTLET BOXES IN TANDEM; BELOW: DOUBLE OUTLET BOXES WITH CABLE CONNECTOR
ARRANGEMENT FOR ADJOINING ROOMS
½" OR ¾" RIGID CONDUIT
COUPLING
ADAPTER
OVAL DUCT
3½"
FRONT VIEW WITHOUT FIXTURE AND PLASTER
Showing by dotted line how Oval Duct can be used for Flex throughout without using rigid conduit; can be installed after partition is finished by channeling slot in plaster.
②
METAL LATH
OVAL DUCT
2, ⅞" outlet boxes bolted back to back.
Wire from here to both fixtures
Splice metal lath and run into joint between boxes
2"
SECTIONAL ELEVATION
DETAIL OF TWIN OUTLET BOXES SERVED BY SINGLE OVAL CONDUIT FOR ELECTRIC LIGHT FIXTURE ON BOTH SIDES OF SOLID PARTITION
CHANNELS
C
A
TRIM
PLASTER
B
CONDUIT
BASEBOARD
CONDUIT
FURRING STRIP "X"
NOTE: ½ WASHER BACK OF CHANNEL TO PROVIDE FOR WIRE TIE
TRIM
DOOR BUCK 2X2"
1⅞"
2"
WIRE TIE
DOOR
ELECTRICAL CONDUIT
METAL LATH
SECTION A-A
④
METAL LATH
GROUNDS
2"
CHANNEL
GROUNDS
5' TO 8'
2'2"
3½"
18" O.C.
5"
TO PREVENT SOUND TRANSMISSION, PLASTER ONE COAT BEFORE INSTALLING CONDUIT
REMOVABLE BASE
ELECTRICAL CONDUIT
SECTION "B-B"
SECTIONS "A-A", "B-B" AND "C-C" ABOVE SHOW DETAILS OF WIRING RACEWAYS FOR BASEBOARD AND AROUND PARTITION OPENINGS.

Fig. 94—Typical Electrical Installation Details for Solid Metal Lath and Plaster Partitions (See text for full description).

thicker solid partitions with a maximum of 3 inches face to face of plaster or (B) specify hollow or double metal lath partitions.

Ordinarily, because the cost of the solid partition is generally less than the hollow type, it is preferred. However, due to the greater increase in cost when the solid partition exceeds 2½ inches in thickness it is recommended that if greater thickness is necessary to obtain the half-inch plaster coverage required over piping, etc., that the hollow or double partition be used.

Advantageous Combinations of Solid and Hollow Partitions:

In many places builders have adopted the plan of running the 2-inch partition as far as possible and then where piping is to be housed offsetting to a large width and using a hollow partition and then back again to the solid partition when the gre width is no longer necessary.

In this manner the space saving and low cos the solid partition can be utilized to the utm while the pipe space of the somewhat more exp sive hollow partition is used only where necessa

For appearance sake and for economy no char in thickness should be made where the offset tion is less than 4 feet long. It will be found m economical to run one face of the combinat partition straight through, making the offsets fr solid to hollow all on the side where they are le objectionable. These offsets should be protec by corner bead. Such single offsetting is prefera to an attempt to centre the hollow on the so partition, both because the appearance is bet and because twice as much corner bead is need- where the partition is centred.

Section No. III Part "H"

Installation of Piping and Plumbing Fixtures

Provisions for Piping—Pipe Chases Recommended:

With the exception of the small supply pipes sometimes used for shower bath installation it is recommended that no provision be made for installing pipe exceeding 1-inch outside diameter in 2-inch solid partitions. Piping up to 1½ inch in outside diameter can be installed in 2½-inch solid partitions.

It is, however, much easier and more satisfactory to plan the piping diagram so as to use pipe chases from basement to roof and arrange the fixtures so that they are contiguous to them and take up the minimum space. This is arranged without difficulty in the average building by furring out a chase from the column fireproofing and placing office lavatories adjacent to these "wet" columns. This method is used almost exclusively in office building construction where solid partitions are extensively used (Fig. 95.)

Where a pipe stack occurs, a hollow metal lath and plaster partition with two rows of channels should be used. These can be separated any distance to take care of ventilating stacks, and access panels are easily built into them so that the plumbing can be easily reached. The hollow type of partition is also used very largely between bathrooms in apartments and hotels where masonry partitions are used elsewhere in the structure as the blocks do not lend themselves to cutting around the piping without great expense and difficulty, and otherwise occupy much valuable space. For soundproof double partitions between bathrooms, additional sound insulation to prevent sounds of flushing

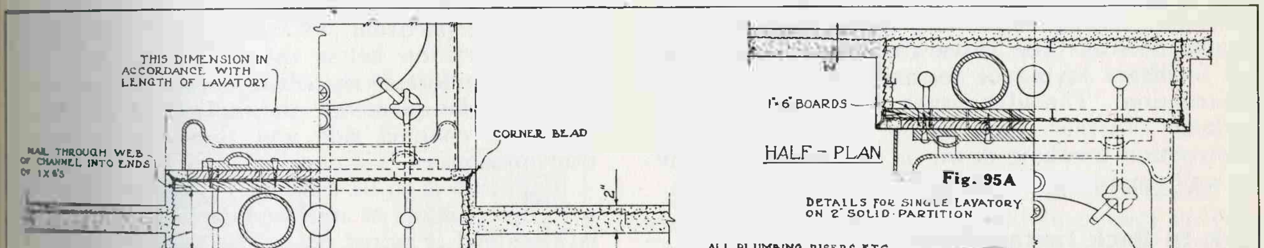

THIS DIMENSION IN ACCORDANCE WITH LENGTH OF LAVATORY
CORNER BEAD
NAIL THROUGH WEB OF CHANNEL INTO ENDS OF 1 X 6'S
2"
THIS DIMENSION DEPENDS ON DIAMETER OF LARGEST PIPE
1×6" BOARDS
HALF - SECTIONAL PLAN
1×6" BOARDS
HALF - PLAN
ALL PLUMBING RISERS ETC. TO BE IN PLACE BEFORE LATHING
VENT
WASTE
CHANNEL
STUDS
SUPPLY PIPE
1X6 BOARD
STANDARD WALL HANGER
HALF - SECTIONAL ELEVATION
HALF - ELEVATION
FOR SOUNDPROOF CONSTRUCTION WASTE, SUPPLY AND VENT PIPES WITH FELT
CHANNEL STUDS
WITH HORIZONTAL CHANNELS
STUD SEPARATORS
METAL LATH
PLASTER
1×6 BOARD
STANDARD WALL BASIN HANGER
WALL HUNG LAVATORY
THIS DIMENSION DEPENDS ON DIAMETER OF LARGEST PIPE
¾ CHANNEL STUD SEPARATOR

Fig. 95A

DETAILS FOR SINGLE LAVATORY ON 2" SOLID PARTITION

Fig. 95B

DETAILS OF TWO WALL LAVATORIES HUNG BACK TO BACK ON SOLID PARTITION WITH PIPE CHASE

Fig. 95C

DETAILS FOR HOLLOW AND SOUNDPROOF DOUBLE METAL LATH PARTITION

Fig. 95—Arrangement of Pipe Chases on Solid, Hollow and Double Metal Lath Partitions, Showing Method of Attaching Lavatories

toilets from annoying occupants of adjoining apartments, is obtained by felt pads wrapped around pipes where they enter, and inside of, partitions. (Fig. 95-C).

Devices for Attachment of Fixtures to Partitions:

Plumbing fixtures, heavy as they are, may be attached to the solid partition with assurance of satisfactory installation if the details described herein are followed.

One-Side Installations:

Lavatories, sinks or similar fixtures hung on solid partitions without the balancing effect of a similar fixture on the opposite side of the partition may be attached by standard hangers screwed to a 1 x 4 of the desired length cut between and nailed to the studs if on the channel side, or a strip ground wired to the studs if on the lath side of the partition. (Fig. 95-A).

The less bulky and economical wall supported type of lavatory is advantageously used. These lavatories occupy minimum space and expedite construction as they leave the entire floor clear and facilitate laying of terrazzo and other floor construction. The advantages to housekeeping are marked. Further, there is no possibility of the construction breaking down or pulling away from the wall regardless of the load applied on the basin.

Back-to-Back Installations:

In the back-to-back installation of kitchen sinks, lavatories, toilets and similar fixtures, a 1 x 4 board is cut between the channels on either side and held by nails driven through the webs of the studs. Matching boards, thick enough to be flush w the finish coat of plaster, are nailed on each s of the partition to the 1 x 4. This gives a s wooden support firmly anchored to the studd Holes are drilled through these boards for anchor bolts used to secure the back-to-back tures. See Fig. 95B, page 85.

Waste pipes, vents, etc., for fixtures on s partitions should be carried in pipe chases as viously described, or pipes may be run up f the floor and left entirely or partially exposed.

Attachment of Fixtures to Hollow and Dou Partitions:

Where hollow partitions are used, installatio simplified. A 1 x 6 board is cut between channels and the fixture is carried either dire on this board or on another strip nailed to it, fl with the plaster, Fig. 95-C, Page 85.

Installation of Bath Tubs:

In the case of built-in bath tubs metal lath s partitions should always be laid out so that t will set close to the lath, instead of the chan side of the partition. When so built, the port of the partition below the top of the tub, a which, therefore, is inaccessible from the bathr side, can be plastered the full 2-inch thickn from the channel side and thus prevent sou transmission.

If the tub is to be tiled in, it may be framed with dwarf studs of steel or lumber and the me lath stapled or wired on to the studs, the scrat coat of plaster run on, and then the bedding c and the tile applied by the tile setter.

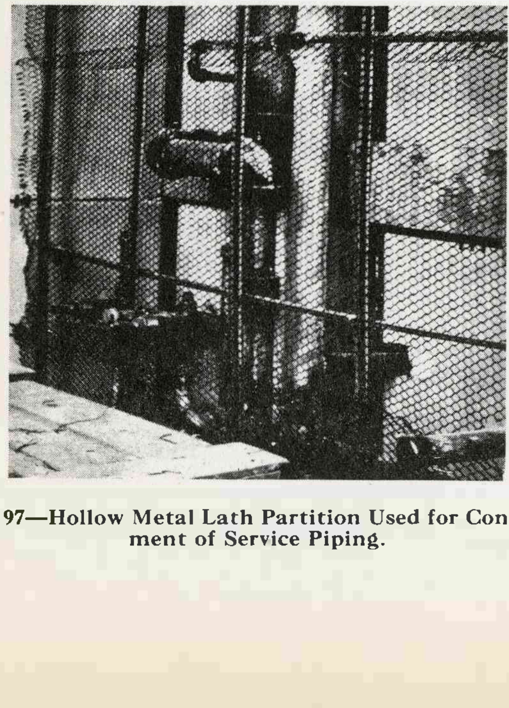


Fig. 97—Hollow Metal Lath Partition Used for Concealment of Service Piping.

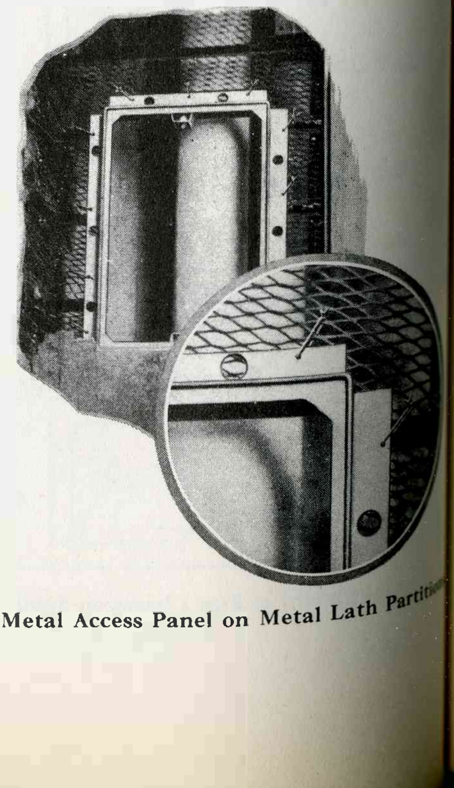


Fig. 98—Metal Access Panel on Metal Lath Partiti

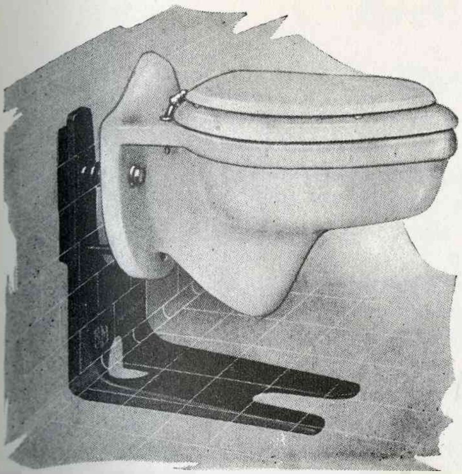


Fig. 99—Adjustable Sanitary Fixtures for Wall-Hung Closets for all types of Metal Lath Partitions.

Miscellaneous Plumbing and Heating Equipment Details:

Medicine Cabinets, Soap Holders, Towel Racks, Grab Rails:

Medicine cabinets of the projecting type are attached to solid partitions by screws into wood grounds. In the hollow or double partitions either the projecting or recessed type is used, the latter being installed by screws or nails to headers cut between nearest channel studs. A new type of electrified bathroom cabinet is adapted for use with the hollow type of metal lath partitions.

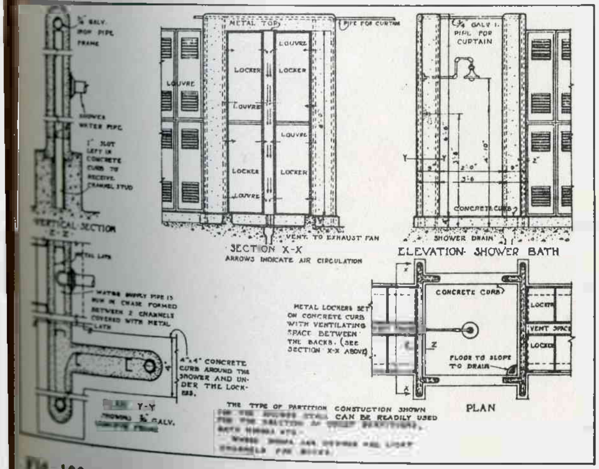

¾" GALV. IRON PIPE FRAME
SHOWER WATER PIPE
1" SLOT LEFT IN CONCRETE CURB TO RECEIVE CHANNEL STUD
VERTICAL SECTION Z-Z
METAL LATH
WATER SUPPLY PIPE IS RUN IN CHASE FORMED BETWEEN 2 CHANNELS COVERED WITH METAL LATH
4"x4" CONCRETE CURB AROUND THE SHOWER AND UNDER THE LOCKERS.
Y-Y
¾" GALV.
METAL TOP
PIPE FOR CURTAIN
LOUVRE
LOCKER
VENT. TO EXHAUST FAN
SECTION X-X
ARROWS INDICATE AIR CIRCULATION
¾" GALV. I. PIPE FOR CURTAIN
2'-0"
3'-6"
CONCRETE CURB
SHOWER DRAIN
ELEVATION- SHOWER BATH
METAL LOCKERS SET ON CONCRETE CURB WITH VENTILATING SPACE BETWEEN THE BACKS. (SEE SECTION X-X ABOVE)
CONCRETE CURB
VENT SPACE
FLOOR TO SLOPE TO DRAIN
PLAN
THE TYPE OF PARTITION CONSTUCTION SHOWN CAN BE READILY USED

Fig. 100—Solid Metal Lath Partition Shower Stall Using Galvanized Pipe Frame.

For the solid partitions there are now available soap holder, towel rack and other bathroom fixtures of the projecting or semi-recess type made of vitreous china. They are embedded in the two inches of plaster without being visible on the other side. These and other devices are also available for hollow and double partitions.

Closet Attachment:

Wall hung closets are entirely practical with concealed adjustable sanitary fixtures (Fig. 99), which carry the load independently of the wall.

Attachment of Radiators to Partitions:

In places where space is a premium it is sometimes necessary to hang radiators on to walls above the floor level. For these places a suitable hanger for bolting to the channels should be used.

Access Panels:

Access panels should be built into pipe chases to allow ready access to piping and emergency valves. The panel fits flush with the plaster and is painted or papered to match the rest of the wall, Fig. 98, Page 86. The frame of this panel is tied to the lath and furnishes an additional ground for the plasterer, while the panel door is held in the frame by two special bullet catches that permit opening the panel by prying out the door with a screwdriver, and replacing it with a gentle pressure of the hand.

Shower Room Doors:

A new type of shower-room door adapted for use with solid partitions is provided with a steel frame or buck which reinforces the construction around the opening and makes a watertight job. Fig. 100.

Section No. III Part "J"

Details of Wood Trim

Door Jamb and Casing Details:

In sections of the country where the use of 2-inch partitions is common, architects have developed a large number of satisfactory details for door casings, trim, borrowed light panels and other millwork used for this type of construction. The details now widely used are a considerable improvement over those used fifteen or twenty years ago.

Two-inch metal lath partition millwork with its narrower buck and jamb departs in some respects from that commonly employed in block and tile partitions. It is for this reason described at some length here so that architects can properly design this important detail.

Many architects rate the appearance of a partition above utilitarian needs. To give the 2-inch partition the appearance of stability which its rigidity and manner of construction rightfully entitles it to, types of door casings are shown, which experience has shown, satisfy this requisite. It is also important to devise trim that will provide amply for adjustment to permit doors to hang and close properly and in general give a clean-cut job. Of course trim cannot be expected to hide bucks which are not built for it. Finally, the detail of the trim should be such that it will not open up or warp and interfere with the privacy of the occupants of rooms, or show disfiguring plaster cracks around doors.

Four Rules for Detailing Wood Trim Around Doors:

To satisfy these requirements the following general principles are recommended after a study of construction details and comparison of durability and appearance of hundreds of door openings in shallow partitions:

(1) The door buck should be firmly secured to the floor and a channel continuous from floor to ceiling provided on the partition side of bucks on each side of the door opening.

(2) Door jambs should be made as much wider than the thickness of the partition as practicable, and wherever possible be of one piece in order to provide the maximum resistance against impact.

(3) Trim around doors should be such that it will lap over the joint between the buck and the plaster not less than one inch.

(4) Jamb or casing details should be employed which will assure the necessary appearance of stability where this is desirable.

Specially Recommended Buck and Trim Details:

Combined Buck and Jamb Offers Satisfactory Detail:

One of the most satisfactory details yet devised consists of only two parts, Fig. 101, Page 90, and is in reality buck and jamb combined. It comes to the job assembled and is erected before any plaster is applied. A piece "B" exactly two inches wide is rabbetted into the back of the frame or jamb piece "A," and thus provides a ground for the plasterer to work to. Members of the jamb and head are lapped alternately so as to make it almost impossible for joints to open up. Exposed surfaces are temporarily protected by stripping to about shoulder height to prevent damage by workmen. After the plastering is done casing or trim is mit'red and cut on the job to fit.

Among the other advantages of this buck are the following:

(1) It can be economically produced as the main portion is cut out of a single 2 x 4 piece. (In most other details 3 separate pieces are needed entailing much more mill cost, and carpenter labour.) (2) The jamb offers a solid 3-inch width to resist impact due to slamming doors. (3) As the door stop is an integral part of the jamb there is no possibility of a stop coming apart or warping to afford a view into the room from the corridor. (4) There is a minimum amount of labour in the application of the trim and this is the only finished carpentry work which is required as all the rest of the frame and trim has been provided in original erection. This eliminates at least half of the carpentry labour in the total erection cost of the bucks, jamb and trim as compared with ordinary construction. (5) The entire width of the trim is only about two-thirds of the width of ordinary casing, a feature which is desired by many architects because of the better appearance of the door opening when narrow trim is used. (6) The casing or trim and in fact the mouldings of the frame itself can be altered to suit any architect's ideas so that a much more ornate effect can be had if desired.

Another Developed Detail:

Jamb construction shown in Figs. 102 and 103, Page 90, combine stability, ease of erection and low cost and are being extensively used. The secret of their strength is in the extra wide jamb which also accommodates $1\frac{3}{4}$-inch doors. Fig. 103 is particularly desirable because the casing grips the edges of the jamb so that buck, jamb and trim form a single unit of great strength.

Sturdy Construction Devised:

Especially sturdy also is the detail of Fig. 106. A solid piece of oak, 1 inch by 4 inches, was used for the door jambs and into it were rabbeted the casings "B" and "C." With the great width of the jamb "A" and the rabbeting, the construction acts as a unit to resist heavy impacts from slamming doors. The back band trim also covers the joint between plaster and buck by a wide margin thus hiding shrinkage of the wood in the bucks. Cracks cannot open up around the doors as the stop is also rabbeted into the jamb. The sturdy appearance of the construction around the door openings is illustrated in Fig. 111, Page 91.

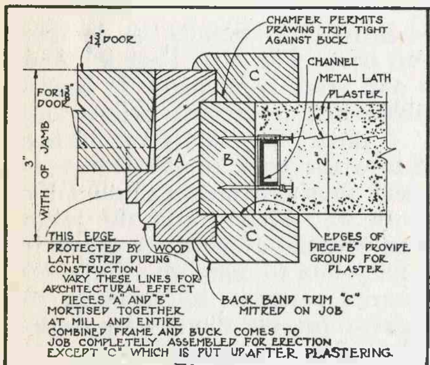

CHAMFER PERMITS DRAWING TRIM TIGHT AGAINST BUCK
1 3/4" DOOR
CHANNEL
METAL LATH
PLASTER
FOR 1 3/8" DOOR
3" WITH OF JAMB
A
B
C
C
2"
THIS EDGE PROTECTED BY WOOD LATH STRIP DURING CONSTRUCTION
VARY THESE LINES FOR ARCHITECTURAL EFFECT
PIECES "A" AND "B" MORTISED TOGETHER AT MILL AND ENTIRE COMBINED FRAME AND BUCK COMES TO JOB COMPLETELY ASSEMBLED FOR ERECTION EXCEPT "C" WHICH IS PUT UP AFTER PLASTERING.
EDGES OF PIECE "B" PROVIDE GROUND FOR PLASTER
BACK BAND TRIM "C" MITRED ON JOB

Fig. 101

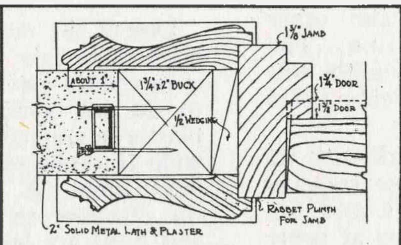


Fig. 102

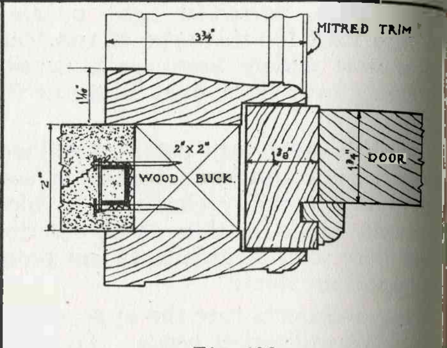


Fig. 103

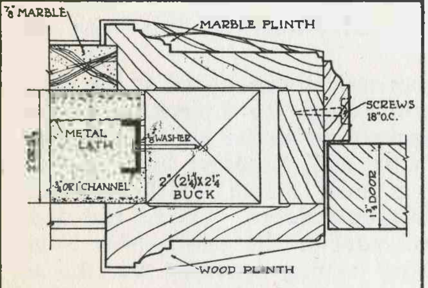


Fig. 104

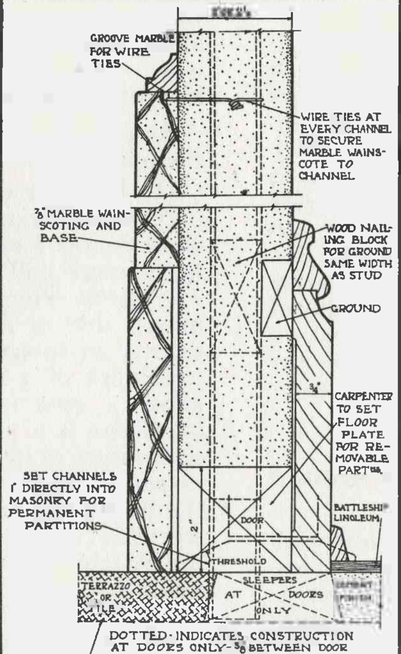

GROOVE MARBLE FOR WIRE TIES
WIRE TIES AT EVERY CHANNEL TO SECURE MARBLE WAINSCOTE TO CHANNEL
7/8" MARBLE WAINSCOTING AND BASE
WOOD NAILING BLOCK FOR GROUND SAME WIDTH AS STUD
GROUND
3/4"
CARPENTER TO SET FLOOR PLATE FOR REMOVABLE PART'NS
SET CHANNELS 1" DIRECTLY INTO MASONRY FOR PERMANENT PARTITIONS
2"
DOOR
BATTLESHIP LINOLEUM
THRESHOLD
TERRAZZO OR TILE
SLEEPERS AT DOORS ONLY
TOP OF SLAB
DOTTED INDICATES CONSTRUCTION AT DOORS ONLY - 3/8 BETWEEN DOOR AND THRESHOLD IN TOILETS

Fig. 104A

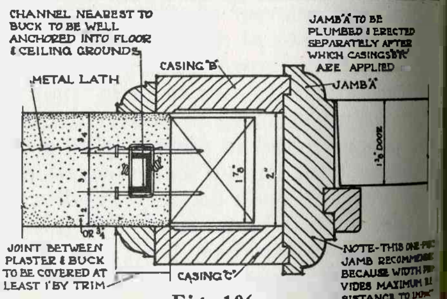

CHANNEL NEAREST TO BUCK TO BE WELL ANCHORED INTO FLOOR & CEILING GROUNDS
JAMB "A" TO BE PLUMBED & ERECTED SEPARATELY AFTER WHICH CASINGS "B" "C" ARE APPLIED
CASING "B"
JAMB "A"
METAL LATH
3/4
3/4
1/2 OR 3/4
1 7/8"
2"
1 3/8" DOOR
JOINT BETWEEN PLASTER & BUCK TO BE COVERED AT LEAST 1" BY TRIM
CASING "C"
NOTE - THIS ONE-PIECE JAMB RECOMMENDED BECAUSE WIDTH PROVIDES MAXIMUM RESISTANCE TO IMPACT OF DOOR

Fig. 106

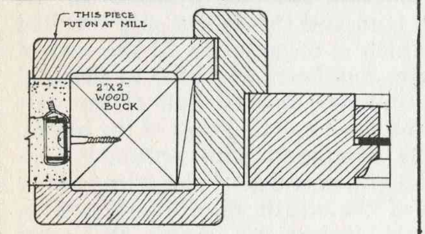


Fig. 105

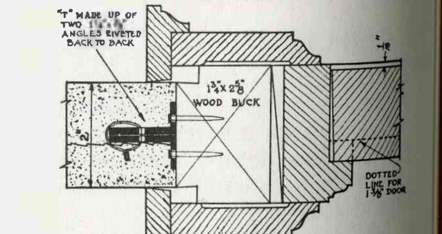

"T" MADE UP OF TWO ANGLES RIVETED BACK TO BACK
1 3/4" X 2 5/8" WOOD BUCK
2"
DOTTED LINE FOR 1 3/8" DOOR

Fig. 106A

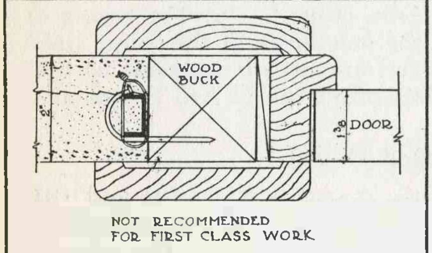


Fig. 108

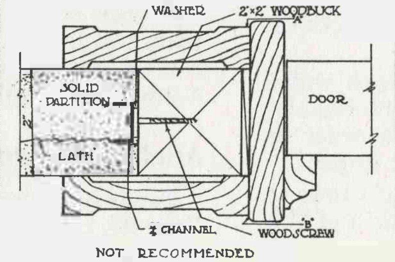


Fig. 109

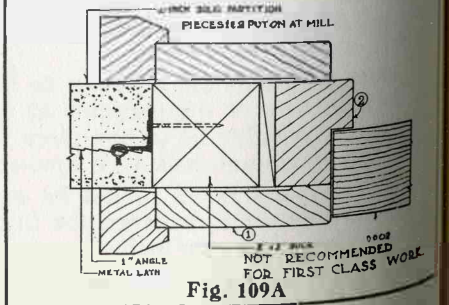

PIECES 1 & 2 PUT ON AT MILL
②
①
DOOR
1" ANGLE
METAL LATH
NOT RECOMMENDED FOR FIRST CLASS WORK

Fig. 109A

Figs. 101 to 106A incl.—Illustrate Recommended Wood Door Buck and Trim Details for Solid Partitions. Figs. 108 to 109A incl. are not recommended for first-class work. (See text).

Other Office Building Door Casing Details:

Details shown in Fig. 104 illustrate a wide casing in which a mould instead of a backband casing is used to give the necessary width to the jamb. This is especially suitable where a marble wainscoting is used as detailed in Fig. 104-A. The performance of this construction as shown by critical examination has been highly satisfactory.

Simple Door Casing Used in Hospitals and Dormitories:

The detail in Fig. 105 has been used again and again. Note that one part of the casing is rabbeted into the wide and sturdy jamb, these two pieces being put together at the mill. This simplifies erection and also provides ample adjustment for any variation in the bucks and for convenience in plumbing up. This detail with its wide rigid jamb is recommended.

Comments on Other Buck and Trim Details:

Any of the details shown in the foregoing can be used with assurance of complete satisfaction in first class work. However, in the belief that architects who prefer to make their own details will also be interested in criticisms of details which have not been found wholly satisfactory, some of these are described in this article. Furthermore, where low first cost is most important or where more or less temporary construction is permissible some of these details may be found desirable.

One of the simplest forms of buck and trim that is satisfactory where cost rather than appearance is the first consideration, is shown in Fig. 108, Page 90. However, it is not recommended for first class work because the narrow jamb does not provide desirable stiffness.

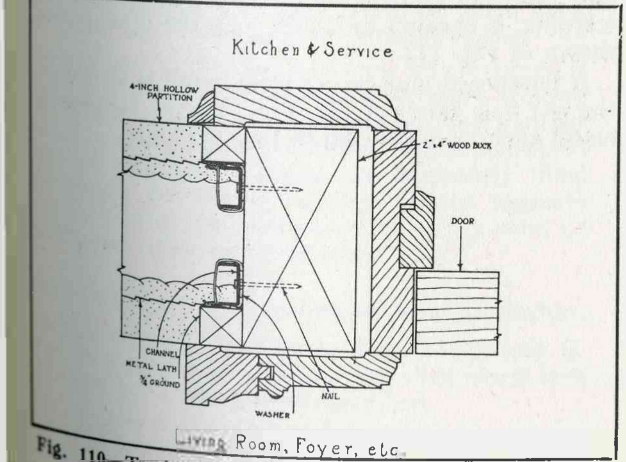


Fig. 110—Typical Wood Buck and Trim Details for Hollow Metal Lath and Plaster Partition.

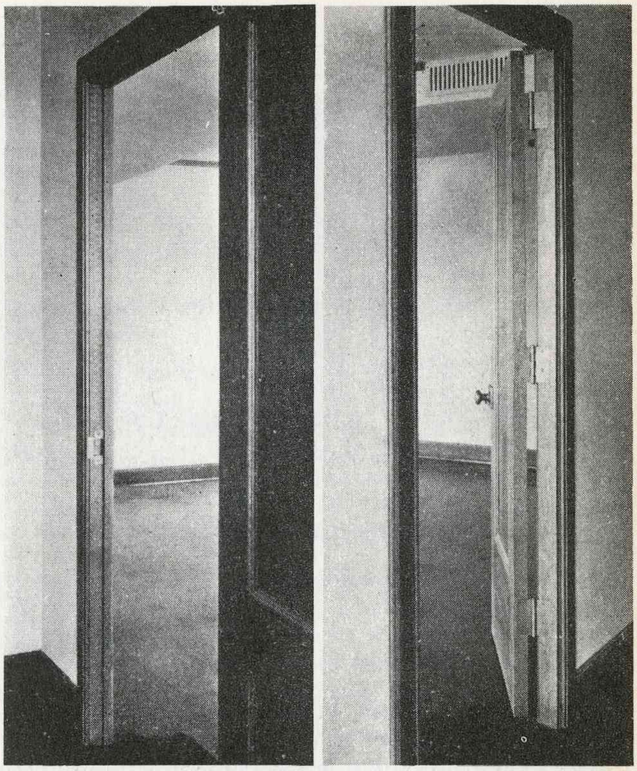


Fig. 111—Jamb and Trim Detail of Fig. 136.

The jamb shown in Fig. 109, Page 90, although more rigid because of its one-piece jamb than that in Fig. 108, is not suited to accommodate irregularities in the door buck so that variations in projection of jamb beyond casing at A and B will undoubtedly occur. Another objection to using this detail is that the casing is not rabbeted to the jamb, or vice versa, and may permit objectionable cracks to open up due to warping or shrinkage. The jamb detail of Fig. 109A, Page 90, is somewhat better appearing than Figs. 108 and 109 because of the back band trim, but it is not satisfactory because screws for the door hinges will not strike solid wood but will enter the joint between jamb and casing. Furthermore, the width of jamb is not great enough for the necessary rigidity to prevent plaster cracks.

Wood Trim for Hollow and Double Partitions:

No special mention need be made relative to wood jamb and casing details for hollow metal lath partitions as any type used for masonry partitions may be readily adapted for this purpose. A typical detail is shown in Fig. 110. Many of those described for solid partitions also may be used for hollow partitions merely by increasing the size of the jamb and buck.

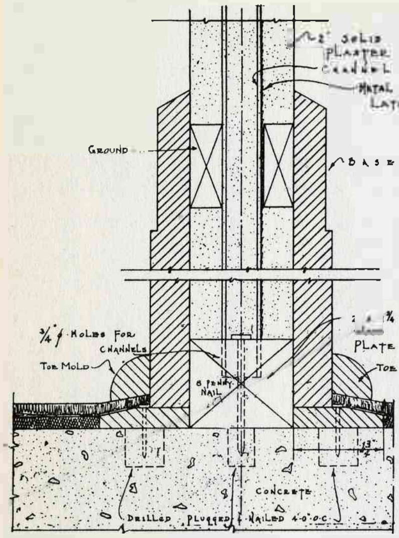


Fig. 112—Baseboard and Carpet Strip Detail.

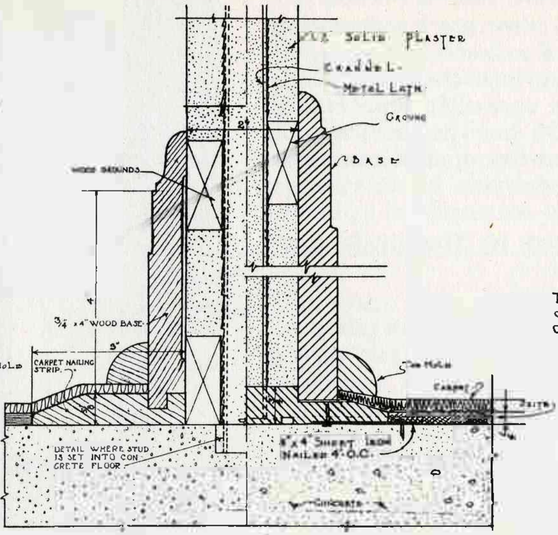


Fig. 113—(Left) Baseboard and Carpet Strip Detail.
(Right) Modification of Fig. 112 Combining Wood Buck and Carpet Strips.

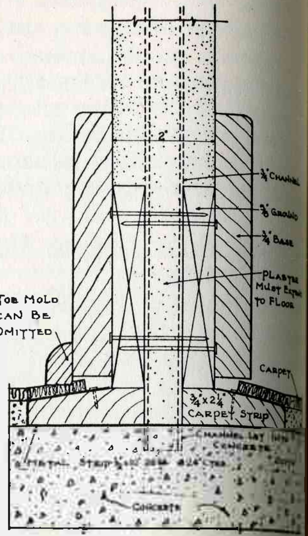


Fig. 114—Carpet Strip and Metal Anchor.

Doors are seldom constructed in soundproof double partitions, but where this is done and maximum sound insulation is desired, the double buck and insulated casing illustrated in Sound Transmission is recommended.

Miscellaneous Wood Trim, Baseboard, and Carpet-Strip Details:

Wood panel strips are attached without grounds direct to solid partitions by dovetail toe-nailing from opposite edges of the molding and will not come loose. For heavy panelling, wood grounds are recommended.

A recent change in construction practice has eliminated wood finished floors in many office buildings and hotels, in corridors of apartment buildings and many other occupancies. In their place all-over carpeting is applied on padding laid directly on the finished cement floors. This has introduced a new problem—that of providing anchorage for the edges of the carpets so that they will lay flat and snug and permit of ready removal for cleaning.

A cheap method where a 2 x 2-inch floor buck is used is to nail a small strip of sheet metal to the underside before laying, and then securing this to the concrete by means of hardened masonry nails. The modification shown at the right of Fig. 113, in which the carpet strip and the floor buck are of one piece and grooved on the underside to prevent warping, is cheaper to install than the three pieces shown in Fig. 112.

A baseboard and carpet strip detail is shown in the left half detail of Fig. 113. Carpet strips and metal anchors are shown in Fig. 114.

Section No. III Part "K"

Metal Trim, Metal Bucks and Door Frames

Improved machinery and increased volume of production together with simplified erection (because hinges, locks and stops are factory-located and assembled), have reduced cost of metal trim so that in many instances it is less expensive, erected, than many types of wood trim. It is specially favoured wherever sanitation, fireproofness and appearance are important requisites.

Metal Lath Partitions Particularly Suited for Use with Metal Trim:

There is a peculiar advantage in the use of metal trim and frames with metal lath partitions. This, because both the trim and the back-bone of the partition—the studs and lath—are all of steel. Thus the two supplement and reinforce each other to make the whole virtually a unitary steel-reinforced partition as contrasted with the dissimilar combination which results when metal trim is used with other partition materials. When bucks also are of metal, the construction is entirely of fire resistive, rigid, non-warping and non-swelling materials and is the last word in permanent partition construction.

Types of Metal Trim and Bucks:

Metal bucks, frames and trim are of several types, depending on whether they are factory-assembled and sent to the job ready for erection, or whether they are made up of several independent members sent "knocked-down" for assembly after arrival at the building. Frames are classified as either combination buck and jamb, or rough buck and finish jamb—and with or without casing.

In addition to the casing or trim which comes as an integral part of the construction, there are two other types: that which is sprung on, and another which is screwed on to the frame. When combined with trim the hollow bucks are frequently filled with plaster, for greater rigidity. When separate from the frame, the bucks may be either solid or hollow, and either metal or wood.

Concealed Type of Metal Buck Now Available:

A new type of metal buck, Figs. 117-A and B, Page 94, specially designed for use with metal lath partitions has already been described.

It not only enables the architect to use any type of standard width trim, but is constructed so that slender casings, as narrow as 1½ inches, can be applied with the assurance of satisfactory architectural detail and stability, together with minimum cost. The buck is so designed that in itself it provides all the rigidity and resistance against lateral shocks and vibrations which are customarily supplied by much thicker constructions.

Flush Type Unfilled Combined Buck Jamb and Trim:

In the flush type of combined buck and jamb construction, Fig. 118, Page 94, a 12-gauge channel forms bucks and frames. Head and jamb are shop welded or riveted to it, thus forming a unit complete with all necessary hardware, ready, after being set and plastered around, for the hanging of the door. Details of anchorage to nearest stud (here shown as a ⅞-inch angle), and to floor and ceiling, and the use of this type of construction in typical partitions both full and partial height, with and without glass panels and transom over doors, are illustrated. This type of finish is advantageously used in schools, hospitals and institutional buildings.

Semi-Flush Jamb and Trim:

Somewhat more ornate is the factory built combination of buck, jamb and casing shown in Fig. 119, Page 94. Note that it is secured by screws at approximate 24-inch centres to the continuous 1¼-inch tee (or channel stud) extending from floor to ceiling and supplied by the lathing contractor. The flare and additional width of the construction at the point where it is attached to the tee makes it possible to build a 1¾-inch door in the 2-inch partition, and at the same time adds considerably to the rigid appearance and also supplies greater resistance to impact of closing doors.

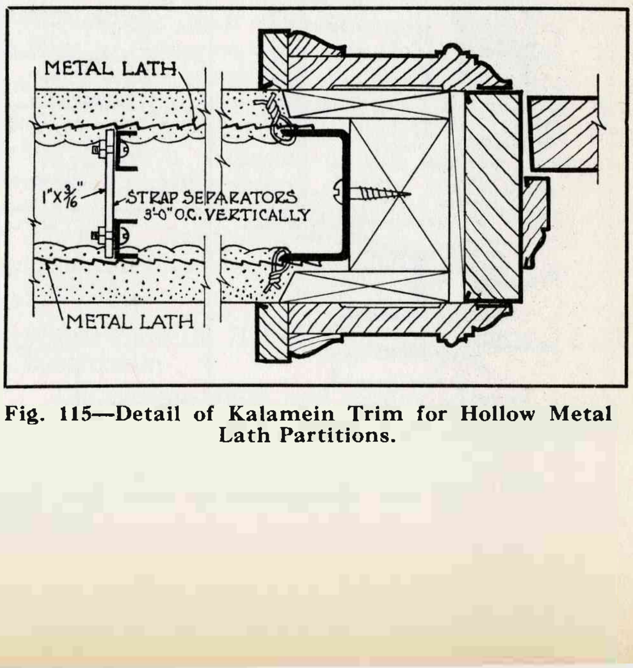


Fig. 115—Detail of Kalamein Trim for Hollow Metal Lath Partitions.

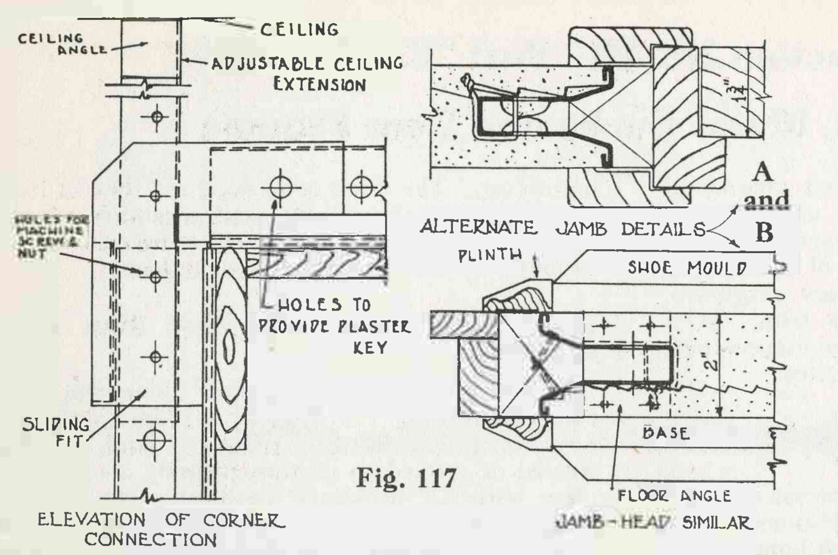

CEILING ANGLE
CEILING
ADJUSTABLE CEILING EXTENSION
HOLES FOR MACHINE SCREW & NUT
HOLES TO PROVIDE PLASTER KEY
SLIDING FIT
ELEVATION OF CORNER CONNECTION
A and B
ALTERNATE JAMB DETAILS
PLINTH
SHOE MOULD
2"
BASE
FLOOR ANGLE
JAMB-HEAD SIMILAR

Fig. 117

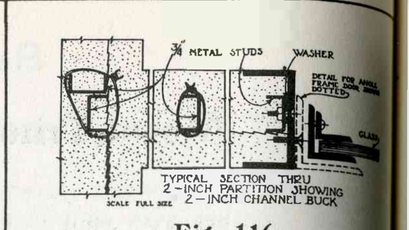

¾" METAL STUDS
WASHER
DETAIL FOR ANGLE FRAME DOOR SHOWN DOTTED
GLASS
TYPICAL SECTION THRU 2-INCH PARTITION SHOWING 2-INCH CHANNEL BUCK
SCALE FULL SIZE

Fig. 116

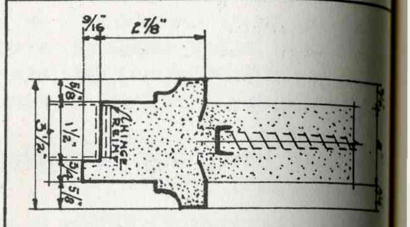


Fig. 119

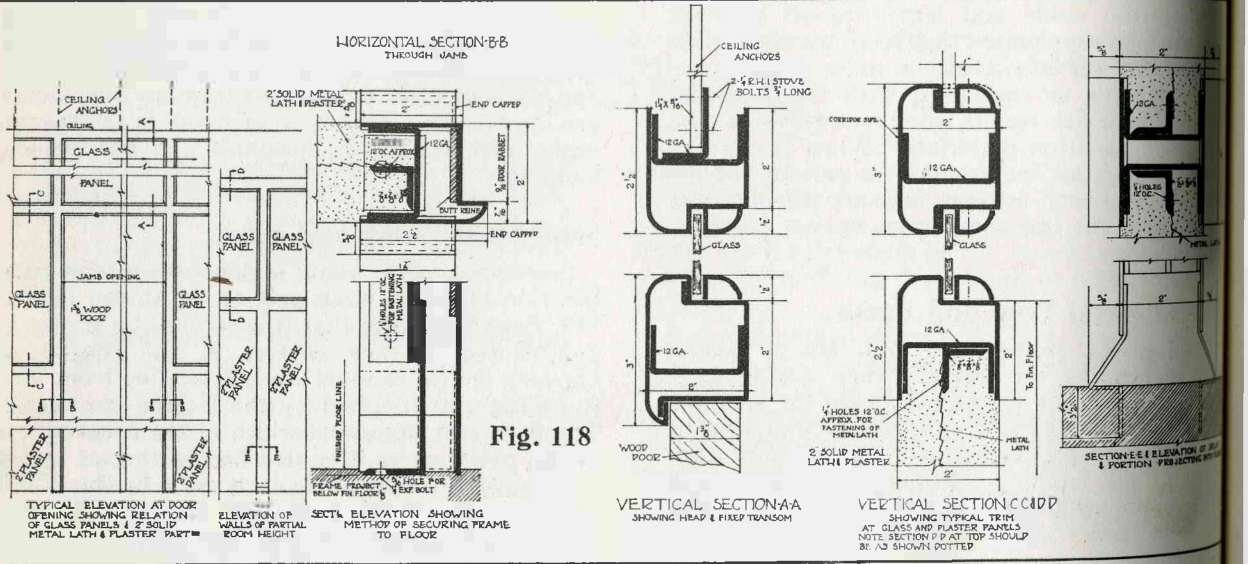

HORIZONTAL SECTION-B-B THROUGH JAMB
CEILING ANCHORS
CEILING
GLASS
PANEL
JAMB OPENING
GLASS PANEL
1⅜" WOOD DOOR
2" PLASTER PANEL
TYPICAL ELEVATION AT DOOR OPENING SHOWING RELATION OF GLASS PANELS & 2" SOLID METAL LATH & PLASTER PARTN
ELEVATION OF WALLS OF PARTIAL ROOM HEIGHT
2" SOLID METAL LATH & PLASTER
END CAPPED
12 GA
DOOR RABBET
BUTT REINF
2½
¼" HOLES 12" OC FOR FASTENING METAL LATH
FINISHED FLOOR LINE
FRAME PROJECT BELOW FIN. FLOOR ⅝"
⅝" HOLE FOR ¼" EXP. BOLT
SECT & ELEVATION SHOWING METHOD OF SECURING FRAME TO FLOOR
CEILING ANCHORS
2-¼ R.H. STOVE BOLTS ¾" LONG
12 GA
GLASS
WOOD DOOR
VERTICAL SECTION-A-A
SHOWING HEAD & FIXED TRANSOM
CORRIDOR SIDE
12 GA
GLASS
¼" HOLES 12" O.C. APPROX. FOR FASTENING OF METAL LATH
2" SOLID METAL LATH & PLASTER
METAL LATH
To Fin. Floor
VERTICAL SECTION C-C & D-D
SHOWING TYPICAL TRIM AT GLASS AND PLASTER PANELS
NOTE SECTION D-D AT TOP SHOULD BE AS SHOWN DOTTED
SECTION-E-E & ELEVATION OF & PORTION PROJECTING

Fig. 118

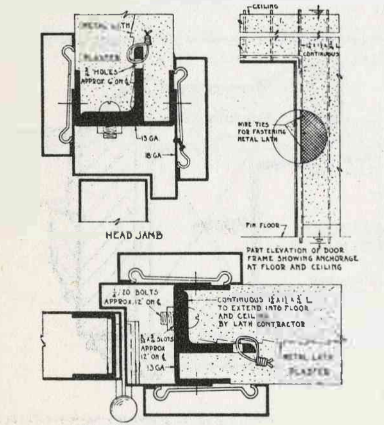

METAL LATH
PLASTER
⅜" HOLES APPROX 6" ON ℄
13 GA
18 GA
HEAD JAMB
CEILING
1¼×1¼×⅛ L CONTINUOUS
WIRE TIES FOR FASTENING METAL LATH
FIN FLOOR
PART ELEVATION OF DOOR FRAME SHOWING ANCHORAGE AT FLOOR AND CEILING
¼/20 BOLTS APPROX. 12" ON ℄
CONTINUOUS 1¼×1¼×⅛ L TO EXTEND INTO FLOOR AND CEILING BY LATH CONTRACTOR
⅜×⅝ SLOTS APPROX 12" ON ℄
13 GA
METAL LATH
PLASTER
SIDE JAMB

Fig. 120

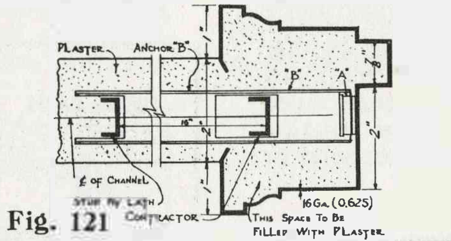


Fig. 121

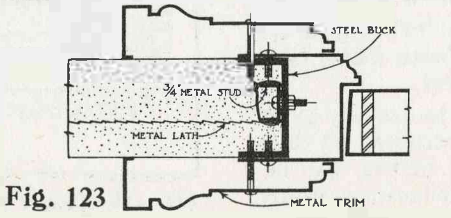


Fig. 123

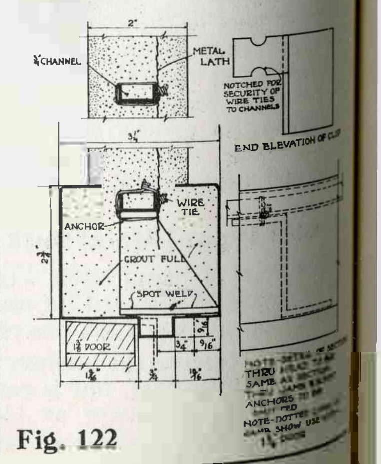


Fig. 122

Figs. 117 to 123 incl.—Recommended Metal Door Buck and Trim Details for 2-inch Solid Metal Lath and Pla Partitions. (See text).

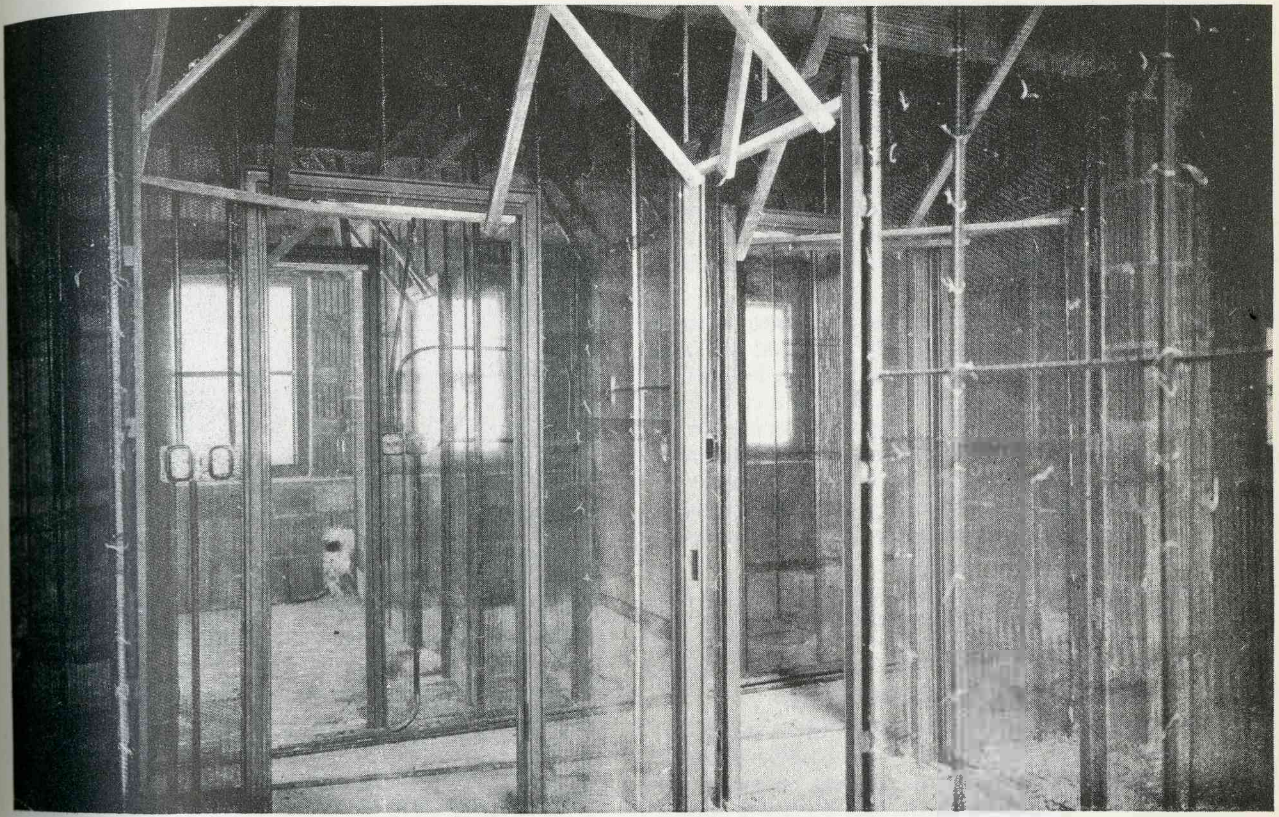


Fig. 124—Metal Buck and Trim Ready for Plastering

In Figs. 116, 118 and 119 the trim, if any, and buck and frame are all in place during the course of plastering.

Unfilled Buck with Clipped or Screwed-On Casing and Frame:

Where more attractive appearance is desired, clipped-on casings, Fig. 120, Page 94, and the screwed-on casings, Fig. 123, are recommended. In the latter the frame also is separate from the buck. It is sent to the job "knocked-down." After the partition is plastered, the frame is screwed to buck, the casing or trim being in turn sprung-on or screwed to the frame. The trim is thus less apt to be marred during the course of construction.

Note that the detached type of casing has two important advantages over the type described under semi-flush jamb and trim. In the first place the buck can be made sturdier because it is hidden better, and in the second place, the buck acts as a ground for the plasterer. This is not feasible in the case of the flared construction of Fig. 118 and plastering is therefore done at a slight disadvantage as compared with Figs. 120 and 123, Page 94.

Grouted or Filled Combined Buck, Jamb and Casing:

A recent development in metal trim construction for solid metal lath and plaster partitions is shown in Fig. 121. This detail differs from those which have been previously described in that the necessary rigidity is obtained by grouting or plastering the hollow space in the combination frame and trim, during the course of plastering the wall, right around the usual channel studs which run from floor to ceiling on each side of the opening. The construction around the doors is thus in fact a unit with the partition construction proper. In this particular design a knock-down anchor secured to the frame is arranged to slip around both the nearest and the second channel studs away from the opening, thus making for very substantial construction. Another good design of grouted-in and anchored buck and jamb is illustrated in Fig. 122, Page 94.

Metal Trim for Hollow and Double Metal Lath Partitions:

The greater width and rigidity of jamb of the hollow partition as compared with the 2-inch solid partition simplifies anchorage to floor and ceiling and permits of considerably greater leeway in design of trim.

Any of the combined or separate buck, jamb and trim details ordinarily used with masonry block construction may be used with hollow metal lath partitions, with this important advantage: It is much easier to erect and tie the bucks to the channel studs by wire ties or ordinary stove bolts than to secure them to masonry with the special anchors required.

Figs 126 and 127 show type of frame with a plaster bead. This is especially adapted for use where a plain architrave is wanted, as in hospitals, schools, etc. The other detail is that of a combination frame minus buck with clipped-on ornamental casing. Fig. 128 shows a standard type of knocked-down frame, with separate rough buck made of 4-inch hot or cold rolled channel jamb, and screwed-on casing. Kalamein trim also is widely used on metal lath partitions of all types (Fig. 128).

These are only a few of the many types of wood and metal buck and trim construction which, over a long period of years, architects have specified and successfully used on metal lath partitions. They are furnished by leading manufacturers.

Although openings for doors are seldom placed in soundproof double partitions, it is entirely feasible to make them resistive to the passage of sound by employing the insulating pads and separate jamb, frame and trim construction illustrated in Fig. 135, Page 126.

Miscellaneous Metal Trim:

Not only metal casing, but base (Fig. 125), stops, scribes, wire and miscellaneous moulding of all shapes, sizes and description are easily applied to metal lath partitions. They are produced by a large number of manufacturers.

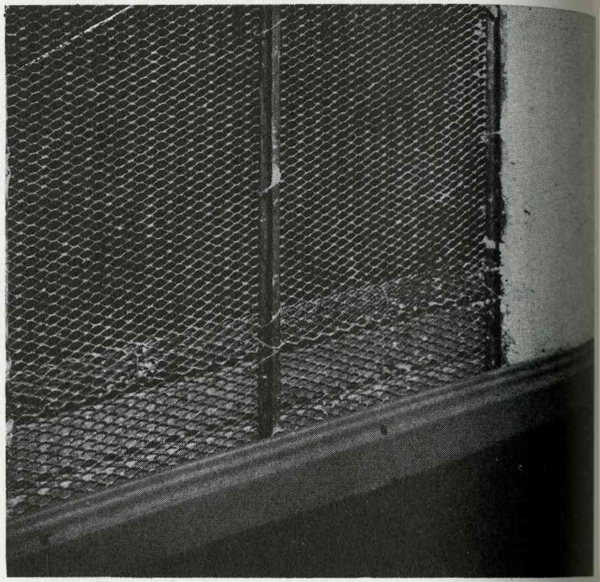


Fig. 125—Application of Metal Base to Solid Partitions (Plaster Omitted to Show Relation of Details)

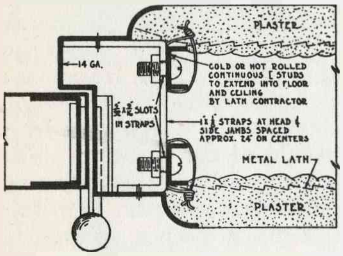

PLASTER
14 GA.
COLD OR HOT ROLLED CONTINUOUS [STUDS TO EXTEND INTO FLOOR AND CEILING BY LATH CONTRACTOR
$\frac{5}{32}$ x $\frac{9}{16}$ SLOTS IN STRAPS
1 x $\frac{1}{8}$ STRAPS AT HEAD & SIDE JAMBS SPACED APPROX. 24" ON CENTERS
METAL LATH
PLASTER

Fig. 126—Dahlstrom Flush "Unitre" Metal Frame and Trim.

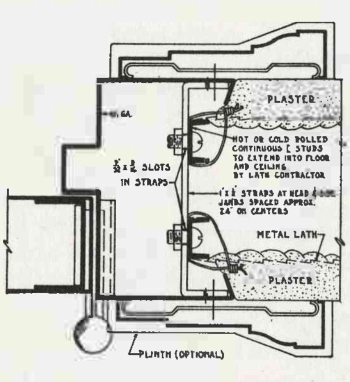

PLASTER
GA.
HOT OR COLD ROLLED CONTINUOUS [STUDS TO EXTEND INTO FLOOR AND CEILING BY LATH CONTRACTOR
$\frac{5}{32}$ x $\frac{9}{16}$ SLOTS IN STRAPS
1 x $\frac{1}{8}$ STRAPS AT HEAD & SIDE JAMBS SPACED APPROX. 24" ON CENTERS
METAL LATH
PLASTER
PLINTH (OPTIONAL)

Fig. 127—Dahlstrom Buck and Jamb Clipped-on Metal Casing

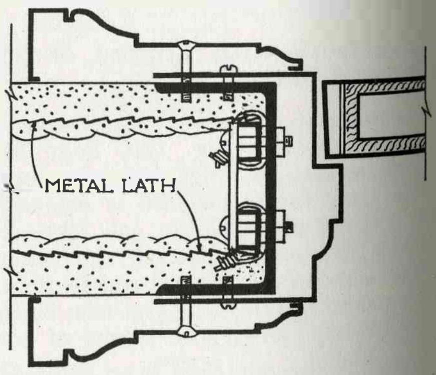


Fig. 128—Knock-Down Frame, Screwed-on Casing

Figs. 126-127-128—Metal Trim for Hollow Metal Lath and Plaster Partitions.

Section No. IV
Metal Lath for Stucco

PLASTER FOR BEAUTY
METAL LATH FOR STRENGTH

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Section No. IV

Metal Lath for Stucco

The use of stucco or plaster dates back to the time of the early Egyptians, Greeks and Romans and examples of this early work remain to this day. The old Roman stucco had many of the properties of modern Portland cement but lacked its dependable uniformity under all conditions.

Stucco is Portland cement plaster commonly used in conjunction with expanded metal lath to finish the exterior walls of residences and other types of buildings. Composed of Portland cement, sand and a small amount of hydrated lime, when mixed with sufficient water to produce a workable mixture, forms a wall which hardens into a stone-like mass—in reality a concrete slab reinforced with expanded metal lath.

Cement stucco is applied without forms and if the specifications shown on page 25 are followed will result in an attractive permanent wall which will add strength and durability to the structure.

No other exterior finish can produce as great a variety of texture and colouring without increased cost. Stucco can be finished to harmonize with any architectural treatment or to blend with any landscape and many particularly fine results have been obtained by combining it with brick and stone.

Colours can be obtained by using coloured sand or marble chips in the finish coat or for the more pronounced shades by the use of mineral colouring pigments in the final coat.

Stucco on expanded metal lath will be crack-proof and fireproof. Moisture or extremes of temperature do not affect the metal lath.

Old frame or brick structures may be modernized and their values decidedly increased at a very moderate cost. "Overcoating," as this process is called, consists of covering the outside walls with metal lath and stuccoing. Buildings treated in this manner can hardly be distinguished from a new house and the overcoating insulates the interior against extremes of heat and cold as the stucco has no cracks, joints or crevices.

New Construction:

Metal lath and stucco may be used over any type of construction, the usual method, however, is over wood studs and sheathing or the sheathing may be omitted, in which case the stucco is back plastered between the studs.

Metal lath and stucco over sheathing is commonly used in residential construction. No special framing of walls is required and the same details for openings where siding is used are applicable to stucco. Wood studs should not be less than the standard two by fours spaced not over 16 inches on centres and resting on a sill bolted to foundation wall. Adequate bracing should be installed midway between storey heights together with diagonal bracing at all corners of each storey.

Over this frame the sheathing laid horizontally is securely nailed at each stud, provision being made to fire stop between studs at their juncture between floor and ceiling joists. This fire-stopping may consist of basket shaped metal lath fitted between studs, plastered and filled with incombustible material.

Metal flashing at water tables, over all door and window openings, wherever projecting wood trim occurs and at all horizontal courses and elsewhere where water might get behind stucco should be carefully done before lathing is started.

For insulating use a substantial waterproof building paper, quilting felt or other waterproofed form of insulation laid horizontally and commencing at the bottom so the upper strips lap over the lower ones at least two inches.

The metal lath consisting of expanded metal lath, self-furring lath or rib lath is then applied. When expanded metal lath is used it is attached with self-furring nails to hold the lath away from the sheathing and thereby provide space back of the lath for the stucco to form a key and surround the lath. The lath should be applied with the long dimension of the sheet across the supports and with the ribs of self-furring and rib lath against the sheathing. Application of the lath should commence at the top right-hand corner, one stud away from the corner, bending sheets around the angle so that no joints will occur at corners. Where self-furring or rib lath is used, however, the lathing may start at corners and Cornerite should be applied at all angles.

Typical details of stucco on metal lath over sheathing are shown on the succeeding page, Fig. 129.

Back Plastered Stucco:

In back plastered metal lath and stucco construction the preparation of the frame of the structure is the same as when sheathing is used except that the sheathing is omitted. The insulation is imposed between interior and exterior face of studs after the stucco has been applied.

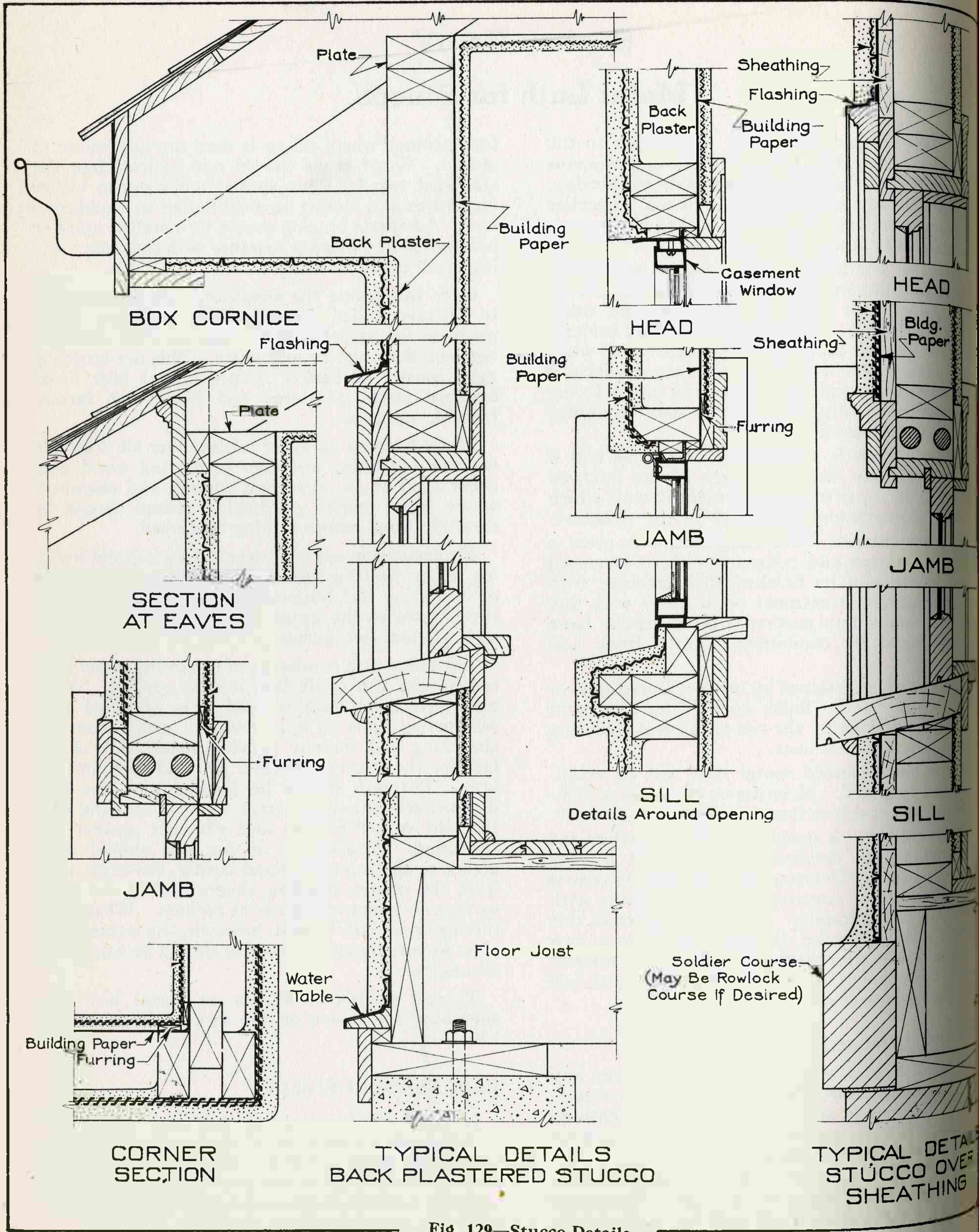


Fig. 129—Stucco Details

After the scratch coat of stucco applied to exterior face of lath has set, the back plastered coat is applied, working the mortar well between the lath and face of studs and thoroughly imbedding the back of lath. The succeeding coats of stucco on exterior face of wall are then applied.

On the preceding page, Fig. 129, is shown typical details of back plastered metal lath and stucco.

REMODELLING AND MODERNIZING

Concrete stucco is not like other stucco and should not be confused with less permanent materials. It is not injured by water. It grows stronger and harder with age.

Just as concrete sometimes utilizes a steel reinforcement, so architects and engineers have found that concrete stucco applied on wood frame buildings is better enabled to withstand the elements if reinforced with a metal lath base.

Therefore when houses are covered with Portland cement stucco reinforced with metal lath they are protected by a blanket of reinforced concrete.

Portland cement stucco gives new character to old buildings. It is the one material that fits appropriately on the bungalow as well as the mansion. Houses refinished with real concrete stucco will be free from future expense for repairs and maintenance.

Stucco modernizing is particularly adaptable to old frame buildings. The old siding or shingles should be carefully examined and any loose ones renailed or new ones installed if necessary. Where as much as fifteen per cent. of the old shingles or siding must be replaced, it is recommended that all of the siding or shingles be removed down to the sheathing. When all of the old siding or shingles have been left on the building it will be necessary to extend window and door caps, casings and sills as well as all belt courses, etc., to provide for the added thickness of the stucco. The extensions should be designed to project at least one inch beyond the finished new stucco. Metal flashing should be installed over all openings at belt courses and elsewhere where water might get behind stucco.

If flat expanded metal lath is used it will be necessary to apply furring over the old siding or shingles to permit space for the stucco to form a key back of lath. It is recommended that metal rods not less than ¼-inch diameter be used. The use of self-furring lath or rib lath will eliminate the need of furring rods as the ribs of the lath are placed against the old work and thus provide the required space back of lath.

Masonry Walls:

On old masonry, where practicable, the old masonry sills or belt courses should be extended by driving masonry nails into the joints or into concrete, attaching metal lath reinforcing to the nails and pouring concrete into forms built around nails or by applying the concrete with a trowel. Where it is not practical to extend the sills in this manner they should be covered with a heavy metal flashing extending under wood sill and projecting at least one inch beyond the face of new stucco.

Where the old wall is porous, damp-proofing paint should be applied. Water-proof building paper may be used if mortar joints are easily driven into.

Self-furring lath or rib lath can be applied directly over the old masonry by using large head nails driven into the mortar joints. Flat expanded metal lath, however, will require furring strips consisting of ¼-inch diameter metal rods or ¾-inch hot or cold rolled channels spaced not more than 12 inches on centres and running vertically the entire height of wall. These furring strips may be attached to the wall by driving nails into mortar joints at intervals not to exceed 4 feet and wiring the furring to these nails. Care should be taken that space of about ⅛ inch is left between furring and old masonry to permit wiring of metal lath to furring

The metal lath is applied in the usual manner, commencing at the top right corner of building with the long dimension of the sheet across the supports and the ribs of self-furring and rib lath against the old wall.

Quantities of Materials for Stucco:

The following table shows the quantities of Portland cement and sand required for 100 square feet of surface in several proportions of mix and thickness of stucco:

TABLE NO. 4

Thickness of Stucco	Mixture 1:1		Mixture 1:2		Mixture 1:2½		Mixture 1:3	
	Cement Sacks	Sand Cu. Yds.	Cement Sacks	Sand Cu. Yds.	Cement Sacks	Sand Cu. Yds.	Cement Sacks	Sand Cu. Yds.
⅜	2.2	0.08	1.5	0.11	1.3	0.12	1.1	0.13
½	3.0	0.11	2.0	0.15	1.7	0.16	1.5	0.17
¾	4.5	0.16	2.9	0.22	2.5	0.23	2.2	0.25
1	6.0	0.22	3.9	0.29	3.3	0.31	3.0	0.33
1¼	7.5	0.27	4.9	0.36	4.2	0.39	3.7	0.41
1½	9.0	0.33	5.9	0.43	5.1	0.47	4.5	0.50
1¾	10.5	0.39	6.9	0.50	6.0	0.56	5.4	0.60
2	12.0	0.45	7.9	0.58	6.9	0.64	6.2	0.69

If hydrated lime is used it should be added in amounts of from 5 to 10 per cent. by weight of cement.

Hair is used in the scratch coat only in amounts of ⅛ bushel to one sack of cement.

These figures may vary 10 per cent. in either direction due to the character of the sand. No allowance is made for waste.

Colouring for Stucco:

A wide variety of beautiful stucco colour tones that are adaptable for practically any use with the proper mixtures have been tabulated. Depth of the shade produced by mineral colours can be secured only by mixing the materials for a longer time than would be required in work in which colour is not used.

Magnesium fluosilicate has also been used with effectiveness in setting the colours in stucco.

Red oxides of iron produce the most durable red tints. Venetian red should be avoided as it tends to run and fade. Manganese oxide is probably the best material for black although a high grade of carbon black or lampblack is generally satisfactory. Carbon black is light and requires very thorough mixing. Common lampblack should not be used.

TABLE NO. 5

Colour desired on Finished Stucco	Commercial Names of Colours	Pounds of Colour Required for each Bag Cement	
		Light Shade	Dark Shade
Grays, blue-black and black	Germantown lamp-black*	½	1
	Carbon black	½	1
	Black oxide of manganese	1	2
Blue shade	Ultramarine	5	9
Brownish red to dull brick red	Red oxide of iron	5	9
	Mineral turkey red	5	9
Red sandstone to purplish red	Indian red	5	9
Brown to reddish brown	Metallic brown (oxide)	5	9
Buff, colonial tint and yellow	Yellow ochre**	5	9
	Yellow oxide	5	9
Green	Chromium oxide Greenish blue ultramarine	6	

* Only first quality lampblack should be used. Carbon black is light and requires very thorough mixing.

** Should contain not less than 15 per cent of the oxide.

For black use 11 lbs. black oxide of manganese for each bag.

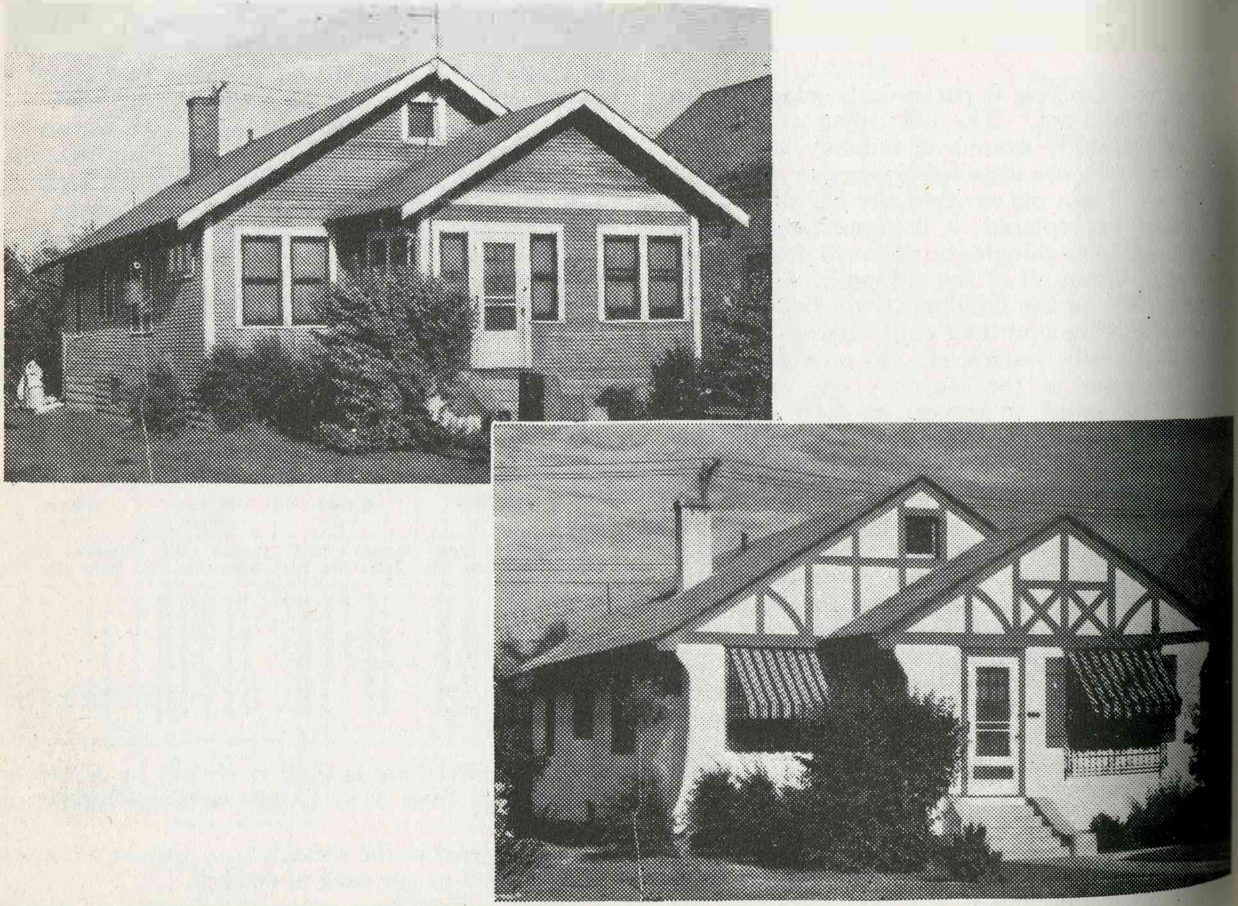


Fig. 130—Before and After Modernizing.

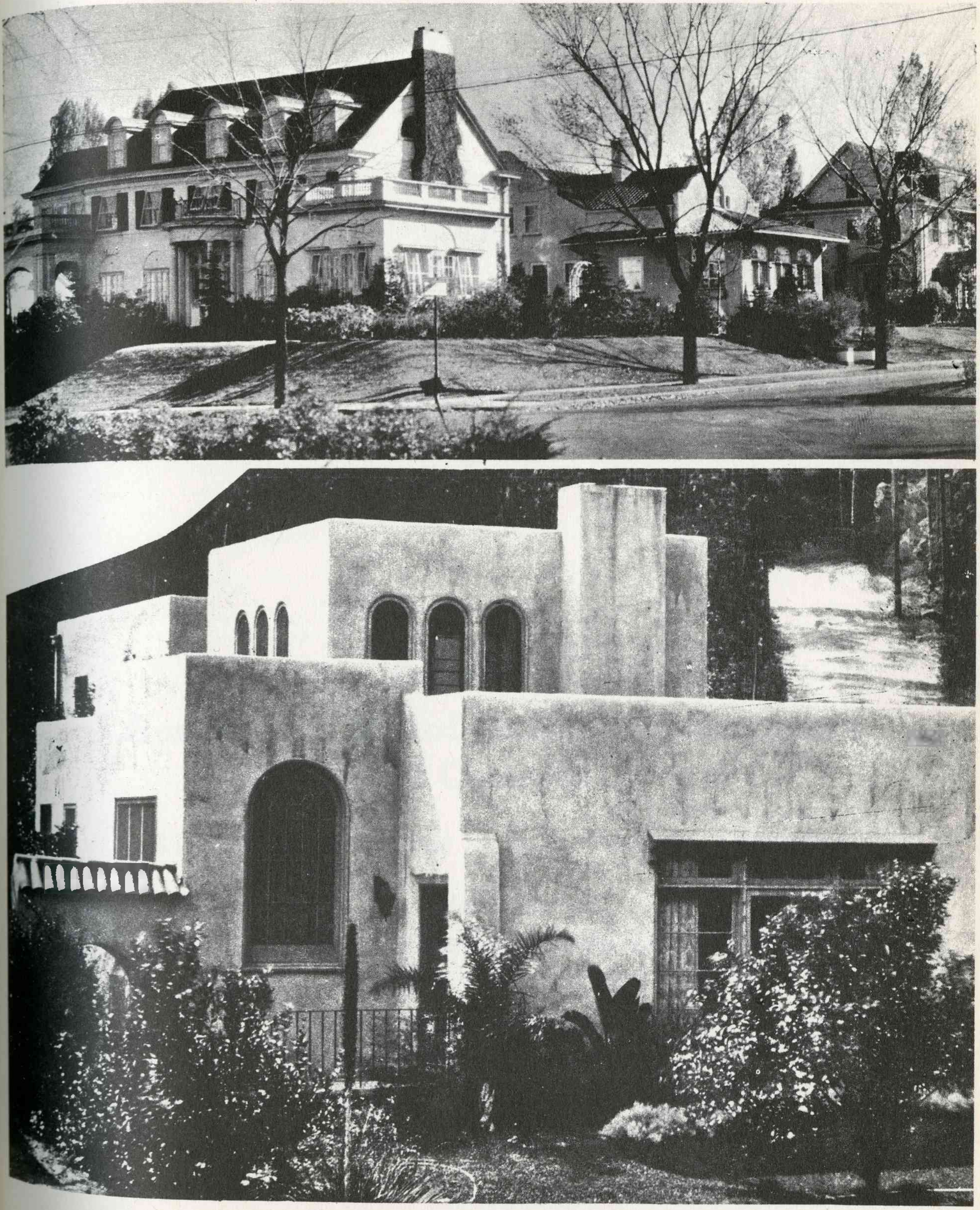
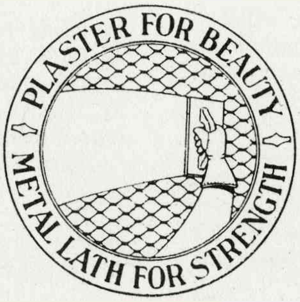


Plate No. 4—Stucco Homes of Beauty.

Section No. V

Costs of Metal Lath



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Section No. V

Comparative Costs of Partitions

Importance of Costs:

Cost is recognized as the second most important factor in the selection of types of partitions for a large majority of all classes of structures and occupancy.

Sight should not be lost, however, of the fact that space saving, discussed in Section III, Part B, is also a cost factor in that it affects the amount of construction necessary to produce a unit of usable floor area; so that space saving and cost should be considered as complementary factors.

Definition of Costs:

Partition cost, discussed in this section, is the total first cost to the owner of any type of partition construction.

This cost in detail is the sum of those portions of the plastering, lathing or masonry, carpentry and millwork contracts which apply to the partitions, together with those items of general building cost which are dependent on or affected by the type of partition employed and which as they are increased when one type of partition is employed, or decreased by another type may be rightfully added to or subtracted from the plastering, lathing and other items in order to arrive at a proper total cost.

Costs Differ with Geographical Location, Freight Rates, Contractor's Experience, etc.:

The cost per square foot of partitions of identical construction varies with geographical locations and difference in specifications and construction methods which have been developed independently, and variation in cost of materials which depends on freight rates.

Familiarity with a type of construction enables the architect to specify the most economical and satisfactory details. Similarly, experienced contractors and journeymen develop methods by which to simplify erection and reduce construction costs.

Prices Vary with Job Conditions, etc.:

The price ranges to be discussed herein are based on actual cost information on specific jobs. They are typical, but no partition cost holds true everywhere and there is no assurance that any contractor will meet these prices on any specific building due to the many factors such as size of job, etc., which affect cost of partitions of identical construction. For the same reasons, no actual cost figures can be considered as applying to all parts of the country or as effective over long periods. However, the comparative difference in average costs as analyzed here will probably be reasonably accurate for a period of years.

New Methods of Erection Assure Minimum Cost; Ample Supply of Skilled Men Available:

With the general adoption recently, by union mechanics, of labour saving methods, costs of solid metal lath partitions are being reduced especially in those cities in which high costs have hitherto prevailed. There is now an ample supply of thoroughly competent lathers and plasterers, and contractors can and do submit bids on the basis of expert workmanship. Architects and builders can specify solid metal lath partitions without fear of stoppage of work due to a lack of qualified men.

Elements Entering Into Cost of Partitions:

In order to simplify this discussion it is assumed that some certain type of commonly used trim and plaster finish or texture is desired. Therefore, the comparison will show the difference in costs necessary to obtain the desired appearance, etc., for each type of partition. Necessarily all cost items which are identical for all partitions will be eliminated and the comparison limited to only those items which differ.

Cost of Partition Materials:

97 Per Cent. of Weight of Materials in Two-Inch Partitions is Low Cost Sand and Plaster:

Freight rate enters largely into cost of fabricated masonry units. Because of their weight they cannot be shipped long distances economically. In the case of clay tiles loss due to breakage is large. On the other hand, rates on gypsum and lime plaster, packaged or bulk, are uniformly low and the loss due to breakage is negligible. Plastering sand is so widely distributed that freight rates and prices are uniformly low.

All partitions use some of these cheaper plastering materials, but none in such large degree as 2-inch solid metal lath partitions of which they constitute over 97% by weight. Hence with respect to cost of materials of construction metal lath partitions are most favourably situated.

Wage Scales in Mason, Lathing and Plastering Trades:

Present wage scales for mechanics in the mason, lathing and plastering trades vary throughout the country, but the difference in any particular locality between them is not large. However, their efficiency varies with their familiarity with the construction under question and so labour costs per square foot of partition may vary as much as 50% as between various parts of the country on the same wage scale.

Price Range for Item I:

Variations in both material and labour costs affect the price range as follows:

The total prevailing cost for masonry partitions such as gypsum block, cinder block or clay tile 3 to 4 inches thick and including labour and material for erection, but exclusive of plastering, and incidental charges, is 15 to 27 cents a square foot or $1.35 to $2.16 per square yard.

The total cost for solid metal lath partitions, labour and materials exclusive of plastering and incidental charges, ranges between 50 cents and $1.10 per yard.

TABLE 6

Analysis of Fireproof Partition Costs

Quantities are for one Square Yard
Both Sides of Partition

Item No.	Description	Contractor	Difference in Favor of	
			3″ Block or Tile Plastered Both Sides	2″ Solid Metal Lath and Plaster
1	Cost of Block and Tile delivered to job, plus labor and mortar for erection	Mason		
	VS.			
	Cost of metal lath and channels delivered to job, plus cost labor and erection materials.	Lathing (Sometimes in plastering contract.)		$0.75
2	Incidental Construction Costs	Various		
-a	Lumber—Cost of Bucks	Millwork		$0.02
-b	Anchorage of bucks to masonry blocks and to floor	Carpentry		0.013
-c	Grounds and cost of application	Carpentry		0.12[1] 0.18[2]
-d	Metal Lath Reinforcing Strips	Lathing		0.027
-e	Chases and Stacks for large piping	Mason or Lathing		
-f	Cost of installation of electrical conduit, etc.	Electrical and Plumbing	$0.01	
-g	Patching grooves cut into block or tile	Lathing or Plastering		0.025
-h	Lintels over wide openings	Miscell.		0.02
3	Cost of Plastering	Plastering	$0.42	
4	Wood trim finish	Millwork		$0.043
5	Dead load (Effect on cost of structure)			$0.00[1] 0.12[2]
		Total	$0.43	$1.02[1] 1.20[2]

[1] Figures for gypsum block.

[2] Figures for clay tile.

Balance favoring 2-inch Solid Metal Lath and Plaster:
as against gypsum block 59 cents per yd.
" " clay tile 77 cents per yd.

Comparing the block and tile with the metal lath each ready for plastering, there is thus a range of $1.35 to $2.16 for the former, and $0.50 to $1.10 for the latter. The average difference, exclusive of plastering and incidental items, in favour of metal lath is about 75 cents. (See Table 6).

Incidental Construction Costs:

(a) Lumber—Cost of Bucks:

Two to three times as much lumber is required for rough door bucks for block partitions finishing 4½ to 6½ inches thick as is necessary for 2-inch solid metal lath partitions. If steel bucks are used the same proportionate increase in materials holds good. At $50.00 per M, the saving on wood bucks for each 3-foot opening using 2-inch solid partitions is 37 cents where the bucks for the block are plain. Where the bucks are rabbeted (unnecessary for metal lath), the saving is 45 to 50 cents per opening.

For the average hotel suite of Fig. 62, Page 53, with approximately 56 square yards of partitions and 3 doors, the saving in favour of solid metal lath partitions is 2 cents per yard. (Note that with the combined wood buck and trim, Fig. 101, Page 90, the saving is approximately $1.00 per opening or 5¼ cents per yard).

(b) Anchorage for Bucks to Masonry Blocks and to Floor:

Both in masonry and in metal lath partitions a suitable anchor must be provided to attach the buck to the top of the masonry floors. The cost is substantially the same in both cases. However, in addition to these there are, in block and tile, metal anchors, usually specified under the head, "miscellaneous iron, etc.", necessary to tie the buck to the nearest masonry. These cost extra and the carpentry contractor charges extra for the labour. On the other hand, in metal lath partitions the securing of the nearest channel to the buck is already included in the lather's contract.

The total distributed saving for the lath partition in anchors and labour is a little over 1 cent per yard for the hotel suite mentioned in the preceding paragraph.

(c) Grounds and Cost of Application:

Standard specifications for gypsum block partitions call for wood blocking the full thickness of the partition to be placed between abutting ends of block units and nailed to one of them, a difficult and slow process. To these, wood strip grounds are attached as a ground for plaster and nailing base for the trim. Again, in clay tile partition holes must be punched and wood plugs cut and fitted for the attachment of the strip grounds; or special metal plugs must be provided and inserted by mason contractors. But in 2-inch solid metal lath partitions the steel channels afford frequent and convenient means for attachment of vertical wood blocks and strip grounds at any point in the partition.

The average cost of wood grounds in place, in 2-inch metal lath partitions is 6c per foot of grounds. The cost for two grounds for the base and one ground for picture mould is therefore 18 cents per ft. each side or 36 cents for both. For 9 ft. high partitions this comes to 36 cents per square yard (figured both sides). For gypsum blocks and clay tile the installation costs are 8 cents and 9 cents per lineal foot or 48 and 54 cents per yard respectively (both sides).

The saving in grounds in favour of the 2-inch solid partitions compared with gypsum block and clay tile is 12 and 18 cents per square yard respectively (both sides included).

(d) Metal Lath Reinforcing Strips:

To forestall plaster cracks around door openings in block and tile partitions strips of metal lath about 1 ft. wide are always used over the masonry. These strips are either short pieces set diagonally across top of opening at each side, or run from floor to ceiling with a separate strip horizontally across the top. This is an "extra" for the lathing contractor. Needless to say this item is never necessary for metal lath and channel partitions, as the ordinary construction methods used insure a two-way reinforcing which prevents disfiguring cracks.

Assuming the extra to average 50 cents per opening it will add 2.7 cents per yard to the cost of the block partition of the typical hotel suite.

(e) Chases and Stacks for Large Piping, Ducts, etc.:

Where pipes and ducts exceed 1½ inches and are less than 2½ inches outside diameter, block and tile partitions have an advantage as no furring is required while either a pipe chase or hollow construction is required in the case of metal lath. No extra expense occurs, however, in hotels and apartments where pipe stacks are required regardless of type of partition because of necessity of using pipes from 4 to 6 inches in diameter. The extra expense for chases occurs in the case of solid partitions only in places where chases would otherwise not be required in masonry partitions for the smaller pipe sizes already mentioned. This expense will not cost, when distributed, above 1 cent a yard, and is limited to a very few types of occupancy.

Where pipes, ducts, etc., exceed 4 inches in diameter it is always expensive to try to conceal them by using thick blocks for the entire partition, or to build a shallow masonry block chase around them, or to attempt to cut and fit blocks around the piping. The blocks should be stopped either side of the pipes and the opening covered with metal lath or a separate metal lath and channel pipe chase should be furred out from the block. Either method will save both erection cost and space.

Where the solid metal lath partition is used, chases of this kind are built by furring out, at minimum expense. Where several pipes occur together a hollow metal lath partition can be built any size as a continuous pipe chase at less expense than any combination of masonry and lathing.

Because of these varying conditions no definite cost advantage can be assigned to either masonry or lath partitions on this.

(f) Cost of Installation of Electrical Conduit, Piping, etc.:

Any changes in location of outlets, etc., made before plastering, but after block or tile have been erected and fitted around existing conduits, etc., are accomplished with difficulty by the electrical contractor and at extra expense. In metal lath partitions, on the other hand, the electrician does no tedious chiselling and alterations and additions of outlets, etc., before plastering, can be made at minimum "extra" expense. Conduit is easily tied to lath and channels and just as readily cut loose and relocated. Although it is recognized that first installations in solid metal lath partitions require a little more time because conduits must be located somewhat more accurately than in thicker partitions, experience shows that speed is quickly picked up and subsequent installations made without difficulty. Furthermore, the complete line of new shallow electrical devices now available facilitate the installation of wiring circuits so that both for original installation as well as for changes the costs in new 2-inch metal lath partitions are hardly any, if any, greater than in thick partitions.

Under the circumstances the probable maximum additional charge for electrical installation in metal lath partitions is 1 cent per yard.

(g) Extra for Patching Grooves Cut in Block and Tile:

Grooves which have been cut in block or tile to house conduits must be filled with plaster or covered with metal lath so that the surface will be ready for the plasterer. The cost which will appear as an extra, in the lather's or plasterer's contract, will average about 25 cents for each electrical outlet. Two-inch metal lath partitions require no grooving and no patching.

For the usual conduit runs (except in office buildings where they are provided for in wiring chases), this extra will add 2½ cents per yard to the expense of using block partitions.

(h) Lintels Over Wide Openings in Partitions:

It is generally found most economical to omit the lintel and blocks over openings in tile or gypsum block partitions and cover the entire space with metal lath and channels each side, in which case it is an extra over and above the masonry contract. This expense is saved when 2-inch solid partitions are used as they are always carried over openings without change in type of construction.

The extra for block or tile for construction over openings will average 2 cents per yard in the typical hotel suite.

Cost of Plastering Various Types of Partitions:

The foregoing costs are incidental to completing the partition to the point of plastering. The plastering contractor's bid will show the difference between the labour and materials for applying 4 coats (total for both sides) with a total thickness of 1¼ or 1½ inches of plaster on block or tile partitions as against a total thickness of 2 inch applied solidly in 5 coats on metal lath.

This difference, which includes profit, ranges at present between 20 and 55 cents per yard and averages about 42 cents more for the metal lath solid partition measured both sides complete.

Millwork and Erection of Trim:

Millwork costs for 2-inch solid partitions are less than those for thicker partitions because the former have a narrower finished jamb and head. For a 3 ft. by 7 ft. opening the difference is 5.67 bd. ft.

With finish lumber at $125—$175 per M. for walnut, birch, etc., the difference in millwork for openings in masonry block partitions will average 85 cents more per opening, or approximately 4.3 cents per yard of hotel suite partition. (See also note regarding combined buck and trim which points out opportunity for additional savings).

Labour costs for application of trim runs about the same for all of these partitions.

Effect of Dead Load of Partitions:

Although the difference in weight between 2-inch metal lath partition and gypsum block partitions finishing 4¼ inches thick, is not enough to affect the structural design, the reduction in dead load of 75 to 100 pounds per lineal foot for 2-inch solid partitions as compared with 3 and 4-inch clay tile partitions permits a measurable saving in the cost of the structural framework and in the foundations.

These savings in structural design must be credited to the type of partitions selected. The savings run from 10 to 36 cents per square yard depending on type of structural frame, area and height of building. An average of 12 cents will be assumed.

RECAPITULATION

Cost Saving of 59 to 77 Cents Per Yard in Favour of Metal Lath Partitions:

Scanning the figures in the table showing direct and indirect costs which may be credited to various masonry types and solid metal lath partitions reveals the following:

Item 1 shows the cost of erecting masonry ready for plastering to be 75 cents per yard greater than the cost of lath partitions ready for plastering. Item 3 shows the plastering costs on the metal lath partition to be 42 cents greater than the plastering cost on masonry, both sides. Subtracting, leaves a difference favouring 2-inch partitions, of 33c per yard, an average which varies with geographical locations, wage scales, etc., but which agrees closely with the approximately 10 per cent. advantage in total cost in favour of metal lath partitions which is being quoted by plastering and lathing contractors in many cities.

The table also discloses the remarkable fact that the indirect items, 2, 4 and 5 which are not in the masonry, lathing, or plastering contracts, or when so come under the head of "extras," favour the use of metal lath to the extent of an average of 26 cents per yard as compared with gypsum block and 44 cents as compared with clay tile. Note that on tall structures the dead load savings in the structural frame, may reach the remarkable sum of 36 cents per square yard of partition in which event the total advantage for indirect items only in favour of 2-inch metal lath partitions as compared to clay tile will be 68 cents per square yard. These items, part of the building cost, are frequently overlooked when partition costs are compared. All this is in addition to the savings in construction volume cost due to the space saving advantages of the 2-inch metal lath partitions.

Adding direct and indirect items making the remarkable total average saving using 2-inch metal lath partitions of 59 cents per square yard under cost of gypsum tile and 77 cents under clay tile, with additional savings for tall buildings as already noted.

Specify a Solid Partition Alternate:

The full advantage of these savings and the only way in which an architect can be certain of protecting his client's interest is to use the details recommended and specify or call for an alternate bid on metal lath partitions either in the plastering or in the lathing specifications and an allowance for them in the masonry contract. He should also see that the carpenter, millwork and other contractors are instructed to so prepare their bids that the savings in cost for furnishing and applying bucks, grounds and the trim on metal lath partitions be properly credited to the use of the partition.

Comparing Costs on One Job with Another:

Before concluding this discussion, attention is called to the fact that architects and owners frequently try to reconcile the estimated cost of one type of partition with the cost of the same or other type built under totally different circumstances. In order to be able to make the proper allowances and compare the costs on an equal basis, the following points, in addition to those given previously, must be considered:

(1) Costs will be less the larger the yardage of partitions. A five thousand yard job will be 10 to 25 cents a yard cheaper than a 200 yard job.

(2) Cost to erect partitions is less in buildings under construction than in old occupied buildings because contractor has wider choice of construction methods.

(3) Costs are less where partitions are being built and plastered at the same time as the walls and ceilings than where partitions are plastered separately. Plastering can be planned more effectively and the saving may be 5 to 10 cents a yard.

(4) The higher the partition, the greater the cost; but metal lath partitions can be built to great heights more economically because of their light, reinforced construction, than any others, hence the greater the height, the greater the relative saving if metal lath partitions are used.

(5) The thicker the solid partition the greater the cost, viz: a 2½-inch solid metal lath partition costs more than one 1¾ inches thick.

(6) Partitions are built most economically in buildings with long corridors and few closets and minimum of cut-up areas, i.e., the smaller the proportion of closets to the total partition area the less the square yard cost of partition.

From the foregoing it will be observed that no hard and fast comparison of costs on various jobs can be made and that figures purporting to show the difference in cost between various types of partitions will bear investigation unless the many factors which have been discussed are given adequate consideration.

A Comparison of Costs with Wood Lath and Wood Stud Partitions:

In many localities where metal lath and channel partitions are in common use, costs are so low that they are competing with wood stud and wood lath and plaster partitions that occupy three times as much floor space. Two-inch metal lath partitions are increasingly useful for non-fireproof buildings such as stores, apartments, flats and dwellings where combustible construction has heretofore largely been used in low cost buildings, even those of a speculative nature, and where economy is the first consideration.

Cost of Other Types of Metal Lath Partitions:

(a) Hollow Metal Lath and Metal Stud Partitions:

Hollow metal lath and metal stud non-bearing partitions cost, on an average, one-quarter to one-third more than solid metal lath partitions, but only a little more than masonry. Hollow metal lath partitions are particularly economical where a non-bearing partition is necessary for concealing piping and wiring stacks.[1] Bearing partitions of this type are useful in both interior and exterior walls and very economical.

(b) Soundproof Double Partitions:

Where minimum sound transmission is exceedingly important the double metal lath and metal stud partition is the most economical to build. It costs from $1.50 to $2.00 per square yard, both sides complete, less than a partition consisting of a double row of gypsum blocks or tile, in addition to which there are savings in many of the incidental items described.

(c) Metal Lath and Wood Stud Bearing Partitions:

Ordinary wood studs protected on both sides by metal lath with three-quarters of an inch of plaster are the most economical form of bearing partitions ever devised, to receive a one-hour fire rating. They cost about one-half of the lightest masonry bearing wall when plastered both sides. No other type of fire retarding bearing partition now on the market has the many advantages of economy in first cost, space saving, and provisions for pipe space, etc., that is credited to metal lath protected wood stud construction. It is especially valuable in conjunction with metal lath protected ceilings and 2-inch non-bearing solid partitions. The combination offers maximum cost efficiency and fire safety.

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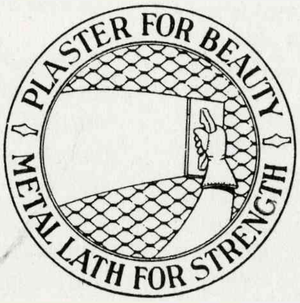
[1] Certain of the Incidental items and Item 5 in Table 6. apply also in the comparison of hollow metal lath with single masonry walls, but the greatest savings are shown in comparing their erection cost with double masonry walls used for pipe chases, around bathrooms, etc.

Section No. VI

Sound Insulation of Metal Lath



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Section No. VI

Sound Insulation and its Relation to Properties of Partitions

Development of information relative to sound insulation has been retarded by lack of the complex scientific equipment and specially constructed buildings with which and in which to make tests, and by the fact that an unusually large number of experiments must be made to obtain reliable results.

Literature on this subject contains a vast array of data much of it expressed in highly scientific terms and considerable portions which conflict. Fortunately, considerable data on which practically all authorities agree is now available. This data has been sifted and checked, original tests have been sponsored and the resulting information represents research extending over a period of ten years. This, together with results of an exhaustive investigation into the practical aspects of sound insulation, is given here to afford an unbiased comparison of some of the more commonly used types of partitions.

Manner of Presentation:

Because this book will reach a variety of readers this discussion on sound insulation is arranged in the following order:

Part 1. A non-technical discussion for those who merely desire to learn the highlights or the principal characteristics of this important subject. Reference for each point is given to the technical discussion in Part 2.

Part 2. A digest of technical data developed by research and experiment by many scientific investigators and which form the background for the discussion of Part 1, for those who wish to go further into the matter. This section is a more complete development of the entire subject and includes sixteen basic rules some of which it is believed are published for the first time.

Citations are given in each case to the various authorities mentioned in the digest of technical data, for the benefit of those who desire to make their own study of the authorities and tests in order to compare their findings with those stated herein.

Part 1

A Non-Technical Discussion

Sound Insulation, Although Desirable, is Only One of Several Important Properties:

Although high rating as a sound insulator is a desirable characteristic it is only one of the many factors by which the efficiency of partitions is judged. Others—cost, weight, space saving—must also be considered. Most of the modern types of fire-resistive partitions provide both a reasonable degree of privacy and quietness. In so far as the partitions exercise control, ordinary sounds within the room are prevented from getting out; sounds originating in adjoining rooms are prevented from coming in. Manifestly no ordinary improvement in partition insulation can offset the admittedly great amount of sound conducted through other sources—floors, ceilings, doors, windows, etc.—which in many instances exceeds that passing through the partitions. With the exception of special instances (music and broad-casting studios, etc.), it is generally recognized by architects and engineers that sound-proofing as a function of partitions has been unduly emphasized.

Distinction Between Acoustical Treatment—for Proper Hearing of Speech and Music or Absorption of Noise—and Sound Insulation:

Much misinformation is extant due to the confusion of meaning of the terms acoustical correction or absorption, which relate to materials and methods used to control sounds, music, speech, and noise, within a room—with the term sound insulation which treats quite differently with materials and methods used to prevent the same kind of sounds from travelling from places in which they originate to others where they are undesirable.

Methods of designing, and materials used in finishing the interiors of large rooms or auditoriums so that the hearing of music, speech, etc., is most nearly perfect, are almost entirely unrelated to the construction methods, design and materials used in walls, floors and partitions to prevent transmission of sounds to adjoining parts of the building. The former is largely a matter of absorption, of prevention of echoes, reverberations, etc.; and whether the sound escapes from the auditorium proper or not is not so vital as clear-cut reception to the audience and the comfort of the speaker. The other is largely a matter of quietness and privacy—no one objects to a noisy neighbouring tenant if the sound stays in his apartment—and this is sound insulation. Only in the slight degree that acoustical absorption relates to the function of partitions as sound insulators, are we interested in the first named subject.

Science Establishes Basic Truths of Sound Insulation:

Attempts to compare sound insulation of partitions under widely different conditions of use and occupancy, and without scientific apparatus, are common. Conditions of use, however, have such great effect upon actual audibility of sounds that unless proper allowance is made for them, results are without value for comparison purposes.

Scientific determinations of the relative insulation properties of materials are made in specially built sound-testing chambers in recognized scientific laboratories, and at present this is the only accepted basis on which to make accurate comparisons[1].

Research by scientists at the United States Bureau of Standards, Bell Telephone Laboratories, Riverbank Laboratories, the University of Illinois and elsewhere has recently been developed to the point where the sound insulative properties of many types of partitions such as clay and gypsum tile and metal lath partitions are accurately compared with each other, and the average person's everyday experiences in the presence of music, conversation and noise properly associated with them. The discussion in Part 1 is therefore largely a series of statements based on these authorities and their experiments. They are quite fully discussed in Part 2 to which the reader is referred for proof.

Sound Insulation Depends Upon Many Factors:

Sound-resisting partitions are only one of several factors in obtaining privacy and quietness. Sound travels through cracks around doors and windows, through ventilator openings, conduits, pipes projecting through partitions, and travels through ceilings and floors. In many instances transmission through floors is greater than through the partitions. When investigating partitions it is easy to mistake sounds transmitted through these sources, for sound transmission through the partition. Therefore, it is useless to have a partition "soundproof" and leave other avenues open permitting excessive sound conduction. The sound proofing should be consistent and all avenues along which sound may travel be shut off. However, these refinements are expensive, especially the insulation of floors and ceilings, and justified only in exceptional cases. Therefore, with the knowledge that sound insulating partitions solve only part of the problem of privacy and quietness let us, assuming average construction for floors and ceilings, etc., see how well ordinary partitions function as insulators.

Weight Most Important Factor in Determining Sound Insulation of Solid or Bridged-Over Partitions:

Scientists have discovered that in the usual masonry or plaster partition weight is the best criterion of sound insulating qualities. This is because sound waves first attempt to set the partition in vibration and the partition in turn sets up sound waves in the air adjoining it which then proceed to the listener's ear. (Fig. 131, Diagram A). The partition's resistance to vibration is found to be proportional to the weight, the greater the weight the less the vibration and the less sound transmitted. (This rule applies quite accurately to solid metal lath, solid brick, clay or gypsum masonry or bridged-over hollow masonry block partitions and even to some types of wood-stud partitions, but not to compotsie or furred-out constructions or double partitions. The latter are discussed subsequently). This close parallel between weight and sound insulation is illustrated in Fig. 132, Page 117, in which are shown the results of scientific tests to determine the sound insulation values of commonly used partitions.[2]

For example, a partition of cored-out hollow gypsum blocks, because it weighs less, transmits more sound than a partition of the same thickness

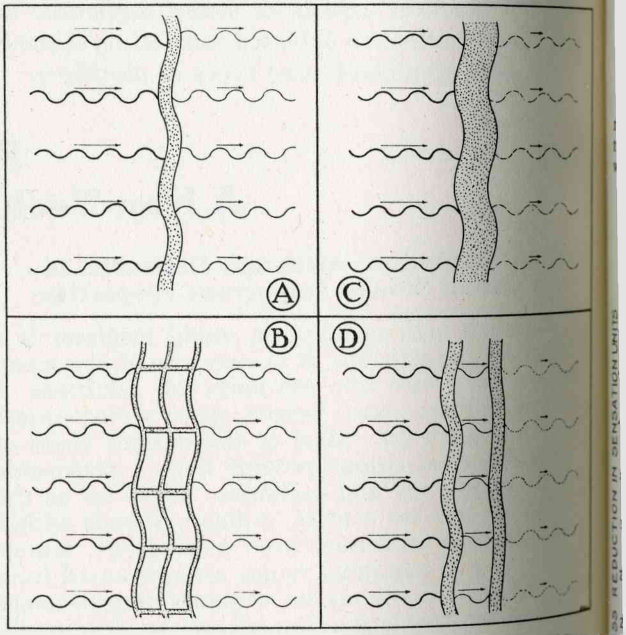

Fig. 131—Comparison of Effect, and Reduction in Intensity, of Air-Borne Sound after Striking: (A) Single Thin Solid Partition, (B) Single Masonry Block Partition, (C) Single Heavy Solid Masonry or Plaster Partition, (D) Double Partition.

Vibration of Partition Shown Greatly Magnified.

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(1) Considerable progress had been made to date in developing special apparatus for making these scientific tests in buildings in actual use but insufficient data is at hand at the present writing and therefore where scientific tests are referred to herein only laboratories data is used.

(2) Loudness of sounds and sound insulation values are measured in Sensation Units (Abbreviated S.U.,) a sensation Unit being the smallest difference in loudness between two sounds, that the average ear can detect.

of solid gypsum blocks. Bridged partitions, such as the hollow metal lath partitions with bridging between the two faces, or clay tile with webs, transmit sound to the same degree as solid partitions of equal weight. (Fig. 131, Diagram B).

(Vibrations transmitting sound are readily carried from face to face of partitions of hollow block construction, through the webs or bridging so that the enclosed hollow spaces are ineffective as sound insulators. This is different from conditions when the two faces of the partition are not connected—Fig. 131, Diagram D).

Sound-Insulation Values of Two-Inch Solid Partitions on a Par With Heavier and Thicker Partitions:

Although sound insulation increases with increasing weight, examination of the curves of Fig. 132, Page 117, shows that in the partition weight-range between 18½ and 28 pounds per square foot of surface (in which are included two-inch solid partitions and 4-inch clay tile plastered both sides to a finished thickness of 5 inches) they flatten out appreciably. In fact, the difference is so small that due to lack of sensitivity of the human ear it cannot distinguish[1] between the sound insulating properties of these partitions under conditions of average building use and they are therefore considered to have equivalent sound insulation properties.

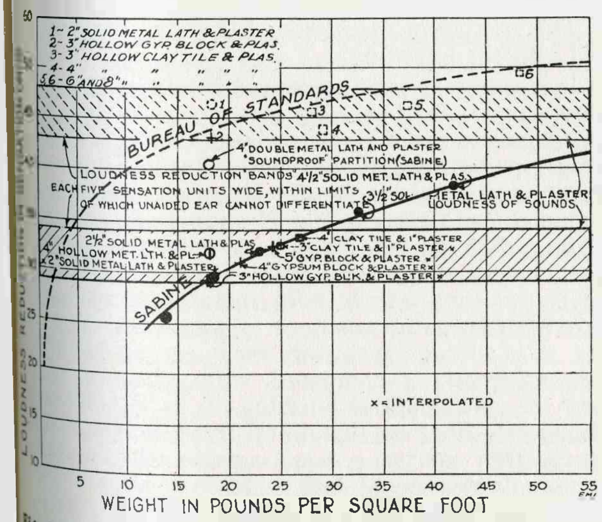

Fig. 132—Relationship Between Sound Insulation and Weight of Partitions.

pper Curve Adapted from Tests at United States Bureau Standards, Lower Curve from Tests by Dr. Paul E. Sabine.

Other Properties of Partitions as They Affect Sound Insulation:

The thickness of a partition does not of itself affect sound transmission, but adding thickness to a partition of homogeneous construction will increase its sound insulation merely because of its increased weight. Nevertheless, sound insulation of partitions of different construction and materials cannot be judged by thickness, for instance, 2-inch solid metal lath partitions have insulation equivalent, in some instances, to other types having double the thickness.

The degree of resiliency of a partition is not a true measure of its sound insulative value and the resilient 2-inch metal lath partition has as much insulative value as stiffer masonry partitions.

The character of the core of the partition is cited by one scientist as a reason for difference in conductivity of various types of partitions of equal weight and indicates that the superiority of metal lath constructions may be attributed to their steel core. In understanding this point it is interesting to refer to the use of plate glass for telephone booths and shower room enclosures. Although much thinner than ordinary partition materials, it provides exceptionally good resistance to sound transmission because of its great weight per unit of surface.

Properties which provide insulation against heat conduction are in many instances valueless in the case of sound conduction. This was conclusively demonstrated in the case of the air spaces in hollow, bridged-over partitions. Scientific tests have also proved that the light, fibrous materials used for heat insulation when built into a partition are in many instances inefficient sound insulators.

Acoustical plasters, drapes and other sound absorbing materials absorb a small part of the sound within a room, but only by that minor amount do they affect transmission to an adjoining room. If the sound absorbent is plaster or other wall treatment it must be in addition to, not part of the original thickness of plaster. Appreciable reduction of weight or mass in the original plaster will increase transmission and more than offset any decrease caused by volume absorption. Experience has shown that equivalent absorption, without loss of sound insulating capacity in the partition, is obtained most economically by placing the acoustic treatment on the ceiling or floor or by using drapes.

Insulation Against Sounds Caused By Machinery Vibration, Etc., Not a Function of Partitions:

Sounds set up by pumps, air-compressors, elevator or other machinery are conducted by direct

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(1) More than 5 "Sensation Units" difference is required to make this distinction. Note that these partitions do not vary this much and all lie within a band about 5 Sensation Units wide as shown in the diagram.

contact and will ordinarily be carried through partitions which satisfactorily resist air-borne sounds, such as conversation, singing, etc. Because the ring of telephone bells attached direct to a partition will similarly be carried through it, architects are now specifying their location on non-dividing walls or partitions. In general all such vibrational sounds must be taken care of at the source by insulation of the machinery, etc. and their solution is entirely apart from the problem of satisfactory sound insulation by partitions. Thus tapping or striking a partition produces no true indication of the resistance of the partition to air-borne sounds.

Under Conditions of Average Use, Two-Inch Solid Partitions Are Found Effectively Sound-Insulative:

Because the ear cannot distinguish sounds of low intensity in the presence of louder ones—such as noises of street traffic, typewriters, etc.—sounds of sufficient intensity to be easily heard in a quiet place are "drowned" on a noisy downtown corner. Thus a partition in a quiet residence section may permit ordinary conversation to be heard in an adjoining room and the partition classed as unsatisfactory for this occupancy and locality. But under other conditions such as in an average downtown office or hotel with the din of street noises, typewriters and what not, conversation on the other side of the same type of partition would be wholly inaudible and the partition considered as very satisfactory. Therefore, the type of occupancy and locality must be considered in determining whether a partition is a satisfactory sound insulator.

While none of the commonly used partitions will shut out a very loud noise, most of them are satisfactory under prevailing noise conditions in most communities, and though not capable of reducing average conversations and radio to the point of total inaudibility nevertheless will lower them to a point where they are not annoying to adjoining tenants. Therefore, this group of partitions, of which the two-inch solid metal lath and plaster construction may be considered typical, is considered satisfactory for use in offices, hotels, apartments, hospitals, etc.

For Exceptional Sound Insulation Use Double Metal Lath Partitions:

Where exceptional quietness is demanded, and expense no great deterrent, partitions other than those previously discussed will need to be used. Although increasing weight is helpful it is found that ordinary solid or bridged-over partitions must be made prohibitively heavy, thick, and costly to secure an appreciable advantage in sound insulation. The same result is obtained without increased weight or very great thickness and much more economically by the use of double partitions. (Compare Diagrams C and D, of Fig. 131, Page 116).

Double partitions, without bridging, are in effect two entirely separated partitions. The operation of converting the air vibrations which carry sound waves into partition vibration, and these in turn setting up another set of air vibration sound waves for transmission to the ear, is doubled. Compare Diagrams D and A, of Fig. 131, Page 116. There are no communicating members (bridging or webs) to cause the two halves of the double partition to vibrate in unison, and tests have shown that the size and disposition of the air separation, rather than the weight of the partition, determines its effectiveness.

When sound insulation is of paramount importance, double partitions of metal lath construction preferably insulated from floors, ceilings and abutting walls, are recommended. They weigh only 18 lbs. per sq. ft. (no more than the 2″ solid partitions), they occupy a minimum of space (4¼ inches) yet they have sound resistance equal to solid or bridged-over partitions weighing 50 lbs. per sq. ft. Double gypsum and clay tile are offered for the same purpose, but the double metal lath partitions cost less, weigh less and occupy less space.

Summary Shows Metal Lath Partitions Solve Problems of Sound Insulation Advantageously:

The preceding discussion, therefore, resolves itself into the following:

If it were only to gain sound insulation irrespective of other factors, solid masonry walls 20 inches thick, sound-proof floors, ceilings, doors and windows would need to be used. But consideration must also be given to the factors of cost, space occupied, and the expense of supporting construction, balancing all factors to gain the greatest practical all-around efficiency. Such analysis clearly shows that 2-inch solid metal lath partitions provide adequate resistance to sound transmission for most occupancies and their use is decidedly advantageous as compared with masonry block and tile constructions finishing up to 5¼ inches in thickness. Further, that where freedom from sound conduction merits special consideration and expense, double metal lath partitions have a high efficiency rating and are more economical, thinner and lighter than other constructions used for the same purpose.

Experience, as demonstrated by the letters of critical building owners and managers confirms the preceding and also corroborates the results of the scientific tests which have been mentioned, and which are fully detailed in the ensuing Part.

Part 2

A Technical Discussion of the Fundamentals of Sound Insulation and Its Relation to Partitions

A technical discussion of sound insulation properties of partitions naturally embraces the following: (1) The fundamental characteristics of and methods of measuring the loudness of sounds, especially those prevalent in and around buildings. (2) The relation of acoustical absorption and acoustical materials to sound insulation. (3) The relation of the physical properties of partitions to sound insulation and the effect building construction details and equipment have on the transmission of sound.

Fundamental Characteristics of Sounds: Sound, How Propagated, Wave Characteristics, Loudness and Pitch:

Sound is defined as "that form of vibratory motion in elastic matter which affects the auditory nerves, and produces the sensation of hearing."

Elastic bodies, solid, liquid or gaseous transmit sound. The velocity of a sound wave is dependent on the elasticity and density of the medium through which it is propagated. The less dense and the less elastic the medium in which vibrations are set up, the less the velocity and the feebler the sound propagation.

Photographic and other analysis shows that sound waves produced in the air by a vibrating body consist of a series of condensations and rarefactions succeeding each other at regular intervals.

Sound may be transmitted directly by waves set up in the air and borne directly to the ears of the listener, or by objects—such as parts of a building which are set into vibration and which in turn set the surrounding air in vibration to form air-borne sound waves.

This discussion of sound insulation will include sounds of speech, musical tones and noises. Each has the two characteristics most important in sound transmission, namely, loudness (or intensity) and pitch (or frequency of vibration).

Loudness depends on the intensity of the sound wave vibration as registered in the ear canal. The lowest point in which the sound energy becomes audible to the human ear is called the "Threshold of Audibility." The upper level of maximum distinguishable intensity is called the "Threshold of Feeling." The area between the threshold of audibility and the threshold of feeling for sounds of each frequency is called the auditory sensation area. The range of hearing of the normal ear is at the intersection of the curves of audibility and feeling and extends from about 16 vibrations per second up to about 21,000.

Relation of Acoustics and Acoustical Materials and Plaster Finishes, to Sound Insulation:

What happens to sound waves when they strike the wall, floor and ceiling surfaces bounding the room in which they originate?

Reflection, Absorption and Transmission of Sound:

It was stated that the velocity of a sound wave depends on the elasticity and density of the medium through which it is propagated.

When sound waves in the air strike a wall or partition or other surface with a different elasticity or density their regular progress is interrupted and the sound energy is in part thrown back by reflection, in part absorbed and in part transmitted. The total of the three is 100 per cent of the incident energy, "the relative amounts being dependent on the changes in elasticity and density of the second medium compared with the first, that is in accordance with the change in the velocity of sound."

A porous material like hairfelt reflects but little sound, absorption is a larger factor. The remainder is transmitted. On the other hand, the density of partitions of the masonry or plaster type is so great that volume absorption is neglible and factors which affect reflection and transmission are most important in analyzing the passage of sound through such partitions.

Sound Insulation of Partitions is Distinct from the Problem Encountered in the Acoustics of Rooms Such as Auditoriums and Theatres:

In sound insulation of partitions we are concerned, generally, with the loudness of sounds in a room or rooms separated by the partitions under investigation from the place in which the sounds originated. In acoustics of rooms we are concerned almost exclusively with the control of sound in the room in which it originates.

Thus in partitions the investigations cover reflection, transmission and volume absorption, of which three the last is of least moment, while in assembly rooms, theatres and auditoriums, investigations cover control of echoes and dead spots, reflection and surface absorption, with the latter one of the most important.

Absorption converts sound waves into heat and by thus diminishing their energy instead of reflecting and scattering them, exerts control. Carpets, drapes, furnishings, acoustic felts, tiles, cloth and certain types of wall and ceiling finishes having absorptive properties are widely employed in controlling reflection and therefore, reverberations. Where the type of structure permits, echoes and dead spots are effectively controlled by proper layout of the shape of the room and by the outline of the reflecting surfaces, and use of absorptive finishes may in a degree be dispensed with. Use of coffering, open grillwork, plaster-relief and irregular shaped plaster ornaments in ceilings is a method frequently employed for this purpose.

Because of the great density of its surface and its elasticity as compared with air, the average plastered wall with a white coat or hard sand finish is a very effective reflector of sound.

Where 93% of light is reflected by the best of silvered mirrors, the plastered wall reflects from 97 to 99 per cent of the sound striking it. Due to its high factor of reflection the plastered surface rates relatively high as a barrier to the passage of sound.

Although acoustic plasters, cloths, and porous materials have absorbing properties which reduce the amount of sound within a room, so that less is available for transmission to an adjoining room, they will decrease the net sound transmission through the partitions by only a very insignificant amount unless the absorbing surface is backed by a dense, rigid medium to prevent transmission of the absorbed sound.

The maximum reduction by means of absorption wall, ceiling and floor covering does not exceed 5 to 7 S. U. which is only one-fifth of the reducing value of an average partition.

Tests by Professor Watson at University of Illinois, showed conclusively that many materials with a porous surface such as hairfelt and corkboard, while absorbing a large part of the incident sound, also transmit a very large percentage.

These materials, therefore, while being of value to prevent reflection and reverberation and to promote quietness in the room of origin, are of doubtful value where prevention of transmission to other rooms is desired, unless they are backed up by a reflecting or non-absorbing surface. Hence the use of unplastered fibre wall boards because they are porous and therefore good sound absorbers is not *per se* an indication that they are satisfactory as means to prevent transmission through partitions of which they are a part.

If the weight of a partition is reduced appreciably by the employment of porous surface materials, it frequently results in greater transmission through the partition, since the weight per unit of superficial area largely determines its sound transmitting qualities.

Because of lesser weight, transmission may be increased by an amount which more than offsets the 5 to 10 S.U. initial reduction by absorptive materials. This has been proved conclusively in various tests. Therefore, the ideal combination is an absorbing surface in addition to the mass of a solid plaster, or equivalent, partition. The dense backing is most economical for effective results.

Surface absorption by the use of special plaster finishes, or by the roughness or texture of unplastered masonry or the use of absorptive cloth or fibrous materials is hardly necessary and seldom advisable in apartments, hotels and similar residential occupancy, because rugs, furniture, curtains, etc., usually afford sufficient absorbing surface.

On the other hand, in offices, hospitals, restaurants and similar occupancies where rugs and furniture are few the use of rough textured acoustic plasters, or absorptive cloth, felt or fibrous materials is frequently warranted on ceilings over the plaster or masonry to prevent the reflection of noises of typewriters, adding machines, etc., and to thus reduce the confusion of sounds within the room in which the sound originates, and incidentally to curtail the amount which may be transmitted.

Sound transmission through solid or bridged-over masonry partitions is independent of the type of plaster used.

Lime plasters are slightly more absorbent, and therefore better suited than gypsum or cement for acoustical absorption, but a comparison of sound insulation values for partitions of the above types, on which various kinds of plaster have been applied seems to favor the denser plasters such as gypsum or Portland cement; but the difference is so small as to be undistinguishable by the average ear.

Relation of Physical Properties of Partitions to Sound Insulation, and Effect Building Details and Equipment Have on the Transmission of Sound:

Rule 1. (a) Sound insulation properties of single solid or bridged-over masonry or plaster partitions depends almost solely upon the weight per square foot of surface of partition.

(b) Transmission through single partitions of hollow blocks increases in proportion to weight lost by coring out block.

Sound that goes from one room to another through partitions is a sound that sets up an actual motion of the air itself, which in turn attempts to move the partition, which in turn moves the air on the other side of the partition to reach the listener's ear. The resistance that any partition gives to that series of events is related largely to the mass that that partition represents in the line of the actual movement of the air. It is the weight of the partition which must be set into motion by the speaker's voice. Therefore, that partition which has the greater mass or the greater weight, if it be of the solid or bridged-over type, is the one most likely to have the greatest sound resistance.

Investigators in this country and abroad confirm this and show that with few exceptions the sound insulating properties of solid partitions of brick, hollow and solid clay tile or gypsum block and solid plaster seem to be in definite relation to the weight, and that increasing weight brings increasing sound insulation.

The value of the sound reduction factor increases approximately according to the formula:

$$\mathbf{R = 10\ (Log\ (W^{\frac{5}{2}}) - k)}$$

Where R = Sound reduction (insulation value) in sensation units.
W = Weight per square foot of surface of partition.
k = Constant.

The lower part of Fig. 132, Page 117, has been drawn in accordance with this formula adopted from tests, and on it have plotted points "A" representing the weights of various partitions. A similar curve from tests at the United States Bureau of Standards is plotted on the upper portion of the same chart. The two differ somewhat because of difference in testing methods.

It will be noted that there is a perceptible flattening of the curve as the weight increases. This decrease in increment persists with increasing weight and shows the practical difficulty of materially improving sound insulation by using single masonry partitions of greater weight. (See Double Partitions for more efficient means of securing low transmission properties).

Until Professor Watson performed the experiments on filled and unfilled gypsum block partitions it was generally considered that the hollow spaces in the units making up hollow block partitions were a material aid in reducing transmission. In fact it was considered that they functioned in the same manner as such spaces do in reducing heat losses through walls.

In those tests the relative transmission of sound through the standard 3-inch hollow plaster block partition, plastered on both sides, with a total thickness of 4 inches, to that through the same partition, with the holes in the block filled, was in the ratio of 3.85 for the unfilled, to 1.16 for the filled blocks.

Thus, more than three times as much came through the hollow as did through the solid.

The lesser transmission through solid block partitions as compared with the bridged-over hollow block partitions of equal thickness has been confirmed by other investigators, among them Dr. Sabine, who found that unplastered 3-inch solid gypsum tile had a reduction factor 2.5 S.U. greater than the unplastered 3-inch hollow gypsum tile.

All investigators agree that the explanation for the failure of the hollow spaces in the bridged-over partitions to reduce transmission is due to the fact that the sound vibrations travel easily along the path afforded by the continuity of the webs of the block or tile. These act as bridges tying together the exposed faces of the partition which function as drum-heads so that both sides of the partition vibrate in unison. Thus the bridged-over partition is considered as a unit instead of two separate members, and its efficiency in stopping sound judged mainly on the basis of its total weight per square foot, as stated in Rule 1. For graphical representation see Fig. 131, Page 116—diagrams A and B.

From these charts it is apparent that knowing the weight per square foot of partition, if it be of the general solid or hollow block, masonry or plaster types, that its resistance to sound transmission can readily be determined by ascertaining its weight per square foot of surface.

Rule 2. (A) Under conditions of average use of partitions the ear is not able to distinguish between those whose insulation values differ by only five or six sensation units.

(B) All the commonly used fire-resistive partitions from 2 inches to 5¼ inches in total plastered thickness and including solid metal lath, gypsum block or clay tile have sound insulation values differing by less than 5 or 6 sensation units and must be considered equally sound insulative.

The unaided ear in the presence of ordinary noise lacks sensitivity to distinguish between sounds unless they differ by more than 5 and sometimes as much as 10 sensation units. Sound tests vary this much on identical construction tested by the same laboratory at different times. Difference in workmanship makes from 3 to 7 or more sensation units difference in transmission. Variations in conductivity, according to the frequency of vibration of the test sound, range from 2 to 20 S.U. and upward, and since the average depends upon the selection of a number of frequency bands of which one investigator will select a greater number or fewer in the high frequency range than another, the average reduction factor may easily vary from 5 to 10 S.U. for identical partition construction.

These are all reasons why partitions which are shown by scientific tests to have average sound reduction factors which do not differ by more than 5 or 6 sensation units may be considered as possessing equivalent resistance to sound transmission.

Accordingly, a horizontal band 5 Sensation Units wide has been drawn on each of the curves of Fig. 132, Page 117, plotted respectively according to the Bureau of Standards' and Dr. Sabine's tests.

Note that although these authorities differ considerably in results obtained on similar construction, that in each case all the commonly used types of incombustible partitions, ranging from the 2-inch solid metal lath partition to considerably thicker and heavier masonry block and tile, lie within their respective bands of 5 Sensation Units width.

This same small unimportant difference was also noted in tests by Professor F. A. Osborne of the Department of Physics, Engineering Experiment Station at the University of Washington, Seattle. Using the same kind of plaster he found that the maximum difference between 3-inch masonry of cinder tile, plaster blocks and of clay and of 2-inch solid partitions was only 3.3 S.U. with one type of plaster and 1.7 S.U. with another type, and even contrasting the two extremes using two distinct types of plaster the maximum difference did not exceed 6.5 S.U. Dr. Chrisler at the Bureau of Standards gave 2-inch solid metal lath partitions weighing only 18.5 lbs. per square foot an average reduction of 46.2 S.U. while 3 x 12 x 12-inch clay tile partitions plastered both sides were given only 44.4 S.U. and 6 x 12 x 12 load bearing tile plastered, weighing 39 lbs. per square foot were rated only 47.1 S.U. and 8 x 12 x 12 tile plastered weighing 48 lbs. had a reduction of only 49.8 S.U. This was only 3.6 S.U. more than the 2-inch metal lath partitions weighing considerably less than half as much.

All of this confirms the observations by Dr. Sabine, after an exhaustive series of tests on various types of solid and bridged-over partitions, that "the difference in the sound reduction is not great enough to furnish a very strong argument in favour of the use of any one of them as compared with the others" and verifies the correctness of Rule 2.

Rule 3. The sound insulation value of partitions of homogeneous construction increases as their thickness increases.

Naturally, in homogeneous partitions greater thickness means greater weight and less conduction of sound. The reason why weight, or mass, rather than thickness is the most important determining factor in the sound reduction value has been shown clearly in the discussion under Rule 1. However, a comparison of actual test results by various investigators will dispel any possible doubt.

Dr. Paul E. Sabine obtained increasingly greater values for solid plaster partitions of increasing thickness, thus proving the correctness of the rule. Professor Watson had some years previously established similar results with various thicknesses of plaster on metal lath. (In both cases it was noted that a thickness of 2½ inches was the economic maximum, slightly improved sound reduction being obtained at the expense of greatly increased thickness, weight and cost. For most purposes, however, the 2-inch partition is preferable).

Rule 4. Thickness is not per se a criterion of sound insulation values of partitions; it cannot be used as a basis for comparison of partitions which are of dissimilar or non-homogeneous construction.

The very important differences between Rule 3 and Rule 4 merit careful thought; failure to appreciate them is the cause of much misunderstanding.

Dr. Sabine shows that a plastered hollow gypsum block partition finishing 4¼ inches has a reduction factor of 30.3 S.U. while a solid metal lath partition of 40 per cent less thickness had a greater reduction factor (32.4 S.U.). Prof. F. A. Osborne showed 51.3 S.U. reduction for 2-inch solid metal lath partitions, which is slightly greater than the 50.4 S.U. for cinder tile finishing twice as thick—4 inches.

Tests by Chrisler and others at the Bureau of Standards showed 2-inch solid metal lath partitions to have substantially the same reduction as some types of masonry partitions more than three times as thick. Other tests show that furred-out and plastered partitions are better insulators than other partitions of the same finished thickness, but without furring.

Rule 5. Solid partitions of metal lath and plaster have sound insulation values greater than those of other solid or bridged-over partitions of equivalent thickness.

Tests by Dr. Sabine show that for a 2½-inch thickness, solid metal lath and plaster has a reduction of 32.4 S.U.; solid gypsum block and plaster has a reduction of 27.2 S.U. For a 4¼-inch thickness, solid metal lath and plaster, solid gypsum block and plaster, hollow gypsum block and hollow clay tile and plaster have reductions of 37.5, 32.8, 30.3 and 32.6 S.U. respectively.

The fact that solid partitions are more sound-resistive than other solid types of equal thickness was also demonstrated by Professor Watson, who concluded that there was good reason to believe that the steel reinforcement in the core of the partition gave it greater strength to resist sound transmission.

Rule 6. (A) Comparative resistance to transmission of air-borne sounds cannot be determined by tapping sounds or percussion.

(B) Sounds generated by impact or vibration should be insulated against at source.

Chrisler and Snyder of the U. S. Bureau of Standards showed very conclusively that while a solid floor weighing 55 pounds per square foot was practically "soundproof" to an air-borne sound (it having a resistance of 55 S.U.), that a tapping sound (such as when a chair is dropped) would go through with almost undiminished intensity (a reduction of only 1.2 S.U.). Floating floors and suspended ceilings were required to make the floor reasonably proof against the impact sounds.

Similar tapping tests on partition structures produce like results and the only effective way to prevent partitions being set into vibration by floors, beams and columns which vibrate because of moving machinery, organ music, etc., is to localize the vibration at its source, i.e., the machinery, organ, etc.

In order that sound of telephone bells will not be conducted they should be located on outside walls or partitions which are not common to two apartments.

Since most sounds are air-borne, sound conduction tests should be made on that basis and not on tapping, since as yet no relationship has been discovered between the two.

Sounds which are not air-borne may be transmitted directly to the structural framework of a building by direct impact or contact of vibrating motors, elevator machinery, heavy musical instruments resting on the floor, etc. Such sounds "pass readily along the continuity of solid materials and . . . are more difficult to insulate than sounds in air . . . they may create trouble when they cause a wall or floor to vibrate."

Insulation against such sounds can be accomplished effectively only by placing a medium of different elasticity and density such as sheet lead, machinery cork, hairfelt, etc., between the source of vibration and the structure.

Another example of this is the so-called "transmission along the partition" proper, of the noise of slamming doors. Observation of various types of partitions in actual use shows that it can be made objectionably loud whether the partition be 2 inches or 5 inches thick.

But as a matter of fact, very little "slamming" noise is conducted along the partition. The sound is projected into the air at the door jamb, just as would the sound of hand-clapping at that point. The noise which is heard in some distant part of the building has reached there via the air because of the echoes and reverberation down the corridor or up the airshaft. Hand-clapping, shouting or other air-borne sounds would similarly be heard due to reflection and re-reflection from the hard, smooth surfaces of walls, floors and ceilings. It is in fact a matter for acoustical correction, and stiffness of the partition is not a factor.

Here, again, common sense dictates advisability of stopping the noise at the source and the use of door checks or rubber or felt door stops and use of proper construction and anchorage for door bucks. Rugs on corridor floors, or, where rugs are not desirable, acoustic absorption on ceilings also will materially correct the propagation of corridor noises.

Although 2-inch solid partitions are admittedly more flexible, the conduction of such sounds along the partition is no greater than the masonry or tile, and tests would probably indicate less because of the continual interposition of steel channel studs which dissipate such sound energy vertically rather than horizontally. Further, the continuity of sound flow horizontally is broken recurrently at every stud due to a difference in density between the plaster and the steel. Masonry partitions, on the other hand, are more uniform in this respect and thus apt to offer less resistance.

Rule 7. Walls equally rigid may differ widely in sound insulation properties.

The following is excerpted from a report of tests by Dr. Sabine:

Description	Relative Stiffness	Sound Insulation S.U.
2½″ Solid Plaster on Metal Lath	**17**	**32.4**
3″ Solid Gyp. Block and 1¼″ Plaster	**130**	**32.8**
4″ Hollow Clay Tile and 1¼″ Plaster	**120**	**34.0**
3½″ Solid Plaster on Metal Lath	**77**	**36.0**

Note that the 3½-inch metal lath partition with a stiffness of 77 had greater sound insulation value than the 4¼-inch solid gypsum block and plaster partition with considerably greater stiffness, 130; and that the 2½-inch solid plaster and metal lath partition with a stiffness of 17 had substantially the same sound insulation value as the stiffer gypsum block and clay tile partitions.

From this test Dr. Sabine reached the following conclusion on which, and the above data, Rule 7 is based: "There is no obvious correspondence between stiffness and sound reduction."

See also discussion under Rule 12 showing advantage of greater resiliency for obtaining greater insulation values in double partitions.

Rule 8. Sound insulation values of partitions vary with the pitch or frequency of the sound, but follow no known law, and an accurate comparison of sound insulation of partitions cannot be made on the basis of one frequency but must be made on several distributed over the musical range.

Practically all tests show less transmission for the higher pitched sounds than for the low pitched. Some of the solid types of masonry or plaster partitions resist the higher pitched sounds better than other partitions; all partitions experience difficulty in preventing the passage of sounds of low frequency; and there is great variation throughout the whole musical range. Therefore, no general comparison of relative sound insulation can be made on the basis of the tests on but one frequency. Results to be of value should be made at wide enough intervals to encompass the major part of the musical range.

Typical examples of the great variation in resistance to passage of sound for various frequencies, shown in Fig. 133, Page 124, are based on tests by Eckhardt and Chrisler at the U. S. Bureau of Standards.

Rule 9. The net audibility in the listener's room of a sound originating in an adjoining room is equal to its original loudness minus the absorption in the

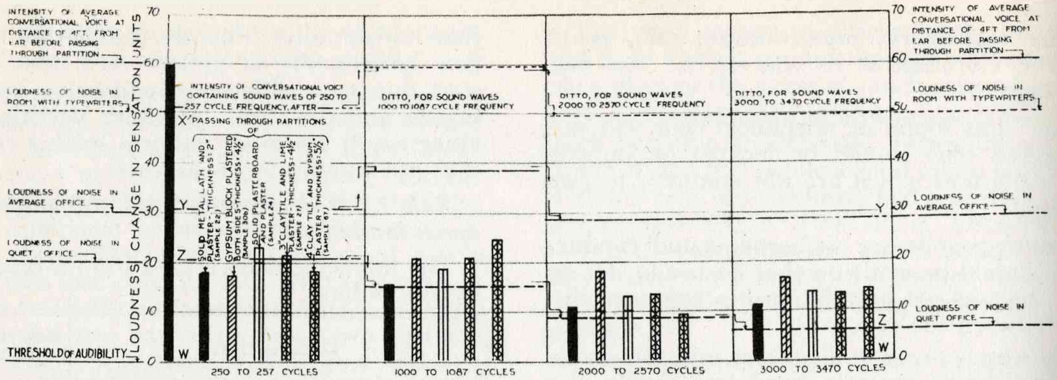

Fig. 133—Relation of Insulative Properties of Various Partitions and of Noise Level, to Frequency of Vibration.

room of origin, minus the insulating value of the dividing partition, minus the absorption in the listener's room, and minus the loudness of extraneous sound in the listener's room, or—

1. $I_1 = I_0 - D_0 - R - D_1 - N$ which reduces to

2. $I_1 = I_0 - R - N$ when absorption of two rooms is neglected.

In the above,

I_1 = Loudness intensity as heard in listener's room.

I_0 = Loudness intensity of sound source in room of origin.*

D_0—Damping or absorptive effect in room of origin.*

D_1 = Damping or absorptive effect in listener's room.

R = Reduction factor (insulating value in sensation units) of dividing partition.

N = Loudness of room noise in listener's room.

*In tests at sound laboratories the sound in room of origin is generated for so long a period of time that the absorptive material, if any, on walls, floor and ceiling in the room takes effect so that the net sound striking the partition reaches constant loudness of I_0-D_0.

This rule may be said to be axiomatic. It is based on fundamental characteristics of hearing. It is used by physicists conducting research in this field. The absorption factors "D" for all ordinary partitions is a small quantity (5 to 7 S.U.) and may be neglected except for special soundproofing requirements. Similarly, D, is negligible when the listener is close to the dividing partition so that for general application the formula resolves into No. 2 above.

Rule 10. None of the commonly used non-bearing dividing partitions are soundproof, as that term should be defined.

This rule follows as a natural sequence to practical application of Rule 9, the insulation values of commonly used partitions shown in Fig. 132, Page 117, and the discussion on audibility of sounds and effect of noise.

Partitions to be "soundproof" must reduce the loudness of sounds, no matter how great the original intensity, to the point where they would become wholly inaudible if the observer were in a room otherwise wholly free from sound.

The audibility of sounds, conversational and musical, after striking an average solid (or bridged over) masonry or metal lath and plaster partition, is shown in Fig. 134, Page 125. Inasmuch as some of these sounds are audible, being above the threshold of audibility to a listener on the side of the

TABLE 7.—EFFECT OF NOISE ON AUDIBILITY OF SOUNDS

Nature of Sound		Intensity in S.U. in Room of Origin, (Values I_0.)	Intensity After Striking Partition, With Insulating value of 31 S. U.[3] Listener[5] in Room Where Noise Factor 'N' =			
			10	20	30	40
			Country Residence	Quiet Office or Suburb	Average Office	Noisy Office
Loud Conversation		80	39	29[4]	19X	9[4]
Average Conversation		60	19X[2]	9	0	0
Soft Conversation		40	0	0	0	0
Average Singing		85	44	34	24X	14X
Telephone Bell	Attached to Partition	75	65	55	45	35
	Not attached	75	34	24X	14X	4
Radio	Loud	90	49	39	29[4]	19X
	Average	70	29	19X	9	0
Violin		87	46	36	26	16X
Saxophone		95	54	44	34	24X

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[2] Using values of 45 S. U. obtained from an average of tests at the United States Bureau of Standards for the same types of partitions reduces the values in each of the columns to the right of the second, by 14 S. U. and would add the positions marked "X" to the list of places where these partitions are "soundproof."

[3] Basis of 31 S. U. for the approximate sound insulation values of 2-inch solid metal lath and of masonry partitions up to 5¼ inches in thickness, derived from data of Dr. Paul E. Sabine.

[4] Louder sounds are made unintelligible by use of double metal lath partitions which are superior insulators. Note all intensities in four right hand columns are thereby reduced 9 S. U. from those shown.

[5] It is assumed that listener is 4 feet away from source of sound in adjoining room.

partition away from the source, none of these partitions can be termed "soundproof."

Rule 11. Partitions of solid metal lath and plaster and others having equivalent sound insulation provide a satisfactory degree of privacy and quietness for most purposes in office buildings, hotels, apartments and hospitals.

The very great effect of noise, on the ability of the ear to hear other sounds was discussed in some details. The fact that partitions, although not soundproof, may satisfactorily shut out annoying sounds in many types of buildings is shown quite clearly in Table 7, and in the graphic representation in Fig. 134, Page 125. Both are developed from the formula of Rule 9: $I_1 = I_0 - R - N$.

Within the heavy shaded lines of Table 7 are included those musical and speech sounds and the corresponding extraneous conditions under which they are listened to, which makes the sounds either wholly inaudible, or unintelligible. Thus these partitions, which include 2-inch solid metal lath, are "soundproof" in the average office or downtown hotel occupancy with respect to transmission of all conversational sounds except very loud speech. The telephone bell in the adjoining room is relatively faint—only 14 S.U.—not a disturbing intensity. For the apartment or hotel in an outlying community with business districts close by, these partitions will shut out average conversation, and reduce loud conversation to the loudness of a whisper. Singing will be heard but in much subdued tones; ringing of a telephone bell, which is not attached direct to the dividing partition, will be considerably muffled; the average radio will be faintly audible but unintelligible. However, by use of drapes, carpeting and upholstered furniture or absorptive plaster, fibre or cloth, these sounds can be reduced an additional 5 to 10 S.U. before they pass through the partition so that they will be wholly inaudible upon emerging.

According to the published tests of the United States Bureau of Standards, whose figures differ, because of different methods of making and interpreting their tests, from those used by Dr. Sabine, loud conversation should be reduced to a very soft whisper in apartments with a 20 S.U. room noise, the telephone bell should also be very faint, and the average radio wholly inaudible. Similar differences occur all down the list.

Note that for all these occupancies, excepting in extremely quiet localities, solid metal lath and ordinary masonry partitions, under average conditions of use, are reasonably soundproof.

Fig. 134 affords a very convenient means of visualizing all the foregoing and should be noted for ready reference.

Table 7 also shows the reason why telephone bells should not be attached to dividing partitions.

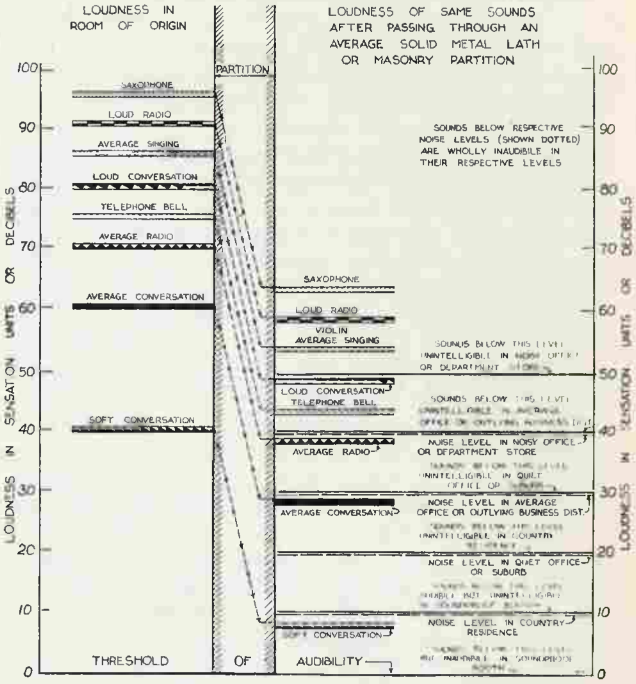

Fig. 134—Loudness of Sounds After Passing Through Average Solid Metal Lath or Masonry Partitions and Their Relative Audibility Under Various Conditions of Noise.

The intensity of ringing is much louder to the listener in the adjoining room when the bell is attached to the dividing partition than when it is attached to an outside wall so that nearly all the sound is air-borne.

The principles underlying Rules 9, 10 and 11 are also illustrated graphically in Fig. 133, Page 124, for average conversation.

Rule 12. Double Partitions in which the two elements or surfaces are completely separated by air, resist sound much more effectively than solid partitions of equivalent total weight. Transmission through each of the halves of the partitions follows Rule No. 1; transmission through the composite construction does not.

The greater effectiveness of double partitions in preventing the passage of sound as compared with solid or bridged-over hollow partitions is attributed to the double change in elasticity and density from plaster to air and again from air to plaster as the sound waves strike the second member. See Fig. 131, Page 116, Diagram D. There is also some reflection back, into the hollow space, of the sound waves which reach the second member. This action contrasts with the single change in elasticity and density of the propagating medium where the partition is solid.

Dr. Sabine's tests give double metal lath partitions with face-to-face of plaster thickness 4 inches, and weighing a total of 18 pounds per square foot an astonishing rating of 40.2 S.U. average sound insulation value (see Fig. 135, Page 126, for method of construction). In contrast a 5¼-inch hollow clay tile and plaster partition weighing 28.8 pounds has a sound insulation value of 34.0 S.U., while a 4½-inch solid metal lath and plaster partition weighing 41.8 pounds has insulation of 38.2 S.U. The 18-pound double partition thus is a better insulator than either of the much heavier hollow or solid partitions of greater thickness. In fact, reference to Fig. 132, Page 117, shows that a solid partition to possess a sound insulation rating of 40.2 S.U. (on the basis used by Dr. Sabine[1]) would need to weigh about 50 pounds per square foot, a prohibitive dead load for all except bearing partitions.

Thus where a superior degree of sound insulation is desirable and slightly greater cost is not objectionable, the double metal lath partition offers a happy solution to the soundproofing problem. Reference to Table 7 shows that the loudness of all but shouting sounds, singing, or a loud radio are reduced to unintelligible and in most cases inaudible sounds, and shouting, etc., reduced to average whispering intensity.

Recent tests indicate that a 2-inch clear separation on the inside of the partition is the minimum which produces satisfactory results. With less separation the confined air acts as a compressed elastic band which has a tendency to cause both halves of the partition to vibrate in unison. A separation of 4 inches will provide 3 to 5 S.U. insulation more than the 2-inch separation; but tests have not yet established the economic maximum separation.

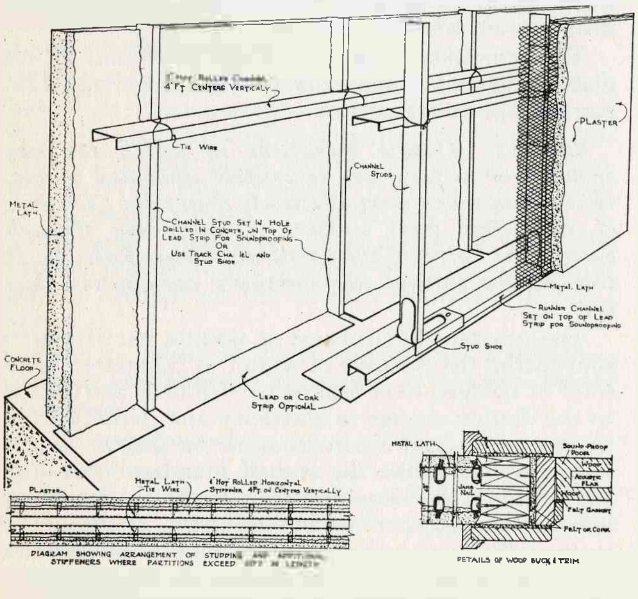
4' Ft Centers Verticaly
Tie Wire
Plaster
Channel Studs
Metal Lath
Channel Stud Set in Hole Drilled in Concrete, on Top of Lead Strip for Soundproofing Or Use Track Channel and Stud Shoe
Metal Lath
Runner Channel Set on top of Lead Strip for Soundproofing
Stud Shoe
Concrete Floor
Lead or Cork Strip Optional
Plaster
Metal Lath Tie Wire
1" Hot Rolled Horizontal Stiffener 4 Ft. on Centers Vertically
Diagram showing arrangement of studding ... stiffeners where partitions exceed ...
Metal Lath
Sound-Proof Door
Wood
Acoustic Flax
Wood
Jamb Nail
Felt Gasket
Felt or Cork
Details of Wood Buck & Trim

Fig. 135—Details of Double Metal Lath and Plaster Partition Construction.

Rule 13. Double metal lath partitions provide insulation substantially equivalent to double masonry partitions of much greater thickness.

The results on double metal lath partitions mentioned compare very favourably with Dr. Sabine's tests on double gypsum block partitions made up of a double row of 2-inch gypsum block with a 2-inch space between and finishing 6 inches in thickness. For the important low frequencies the metal lath construction transmitted less, and for the whole musical scale transmitted an average of only 3.7 S.U. more than the much thicker gypsum block wall. With an increase in width of separation to approximately 4 inches the double metal lath partition would be on a par with the gypsum block.

Tests by Chrisler on double partitions showed substantially equal sound insulation for double hollow back-plastered metal lath partitions finishing 6 inches thick, double 3-inch gypsum block partitions finishing 8½ inches and double clay tile finishing 9½ inches thick and with 1-inch Flaxlinum in the hollow space. Although a double metal lath partition as usually built might have slightly less insulation value than the double hollow back-plastered partition which was tested, the difference would not be important.

Leading physicists state that resiliency in a double partition is beneficial instead of being detrimental, from the standpoint of sound insulation, inasmuch as this particular property tends to prevent its compressing the confined air space which would become a more effective means for transmitting the sound waves to the other half of the partition. Being confined by a resilient wall the air is a more effective and elastic wave-absorbing medium.

Double metal lath partitions, therefore, offer maximum sound resistance with minimum thickness and greatest economy.

Rule 14. (A) Fillers in the hollow space of double partitions produce little or no beneficial effect and frequently increase rather than decrease transmission. (B) Absorptive membranes in the hollow space are effective when they do not touch either half of partition and when the free air space either side is large enough to permit dissipation and absorption of sound energy by the membranes.

Scientific experiments show that most fillers and mechanical ties or separators in the hollow space between the two halves of a double partition materially increases the sound conduction through it. Sabine and Chrisler demonstrated that in practically every case where fillers of felt, quilt, cork, fibre board and similar porous materials were used, that the sound insulation was not only not improved because of absorption of sound by these materials, but that on the contrary many of them functioned as conductors to transmit sound across the space so that frequently more sound passed through the partition than when the air space was unfilled; and that in those cases where better results were achieved there had not been sufficient improvement to warrant the additional expense.

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[1] The basis used is important. Other investigators assign correspondingly higher figures for all these partitions and to make the proper comparison the actual S. U. insulation value would have to be changed accordingly.

Clear proof of the detrimental effect of connections or separators of any kind such as metal separators, wood blocks or other devices used to stiffen the two parts of a double partition was made by Dr. Paul E. Sabine, at the Riverbank Laboratories. The identical double metal lath partition described, when provided with metal separators making it in fact an ordinary 4-inch hollow metal lath partition showed a reduction of only 32.0 S.U. as compared with 40.2 S.U. for the double partitions. The separators thus reduced the insulation efficiency by a considerable amount. However, if these separators had been carefully padded where they made contact with the studs, it is very likely that the results would have been improved considerably.

Although absorbent membranes are frequently used in the hollow spaces of double partitions, sound transmission tests indicate they are of doubtful value when the membrane touches either side of the partition and when the air space on either side of the membrane is so small that it acts as a compacted elastic band so that the sound sets the membrane in motion rather than being absorbed by the latter. However, with a clear separation of 2 to 3 inches either side, the membrane becomes distinctly effective and reduces transmission appreciably.

In the Oliver type of sound resisting partition a double wall of metal lath and channels is used backed up by plaster or fibre board on the inner surface, each side being independent of the other and about 1¾ inches thick. The space between is 2 inches, making a total thickness of approximately 5½ inches.

These are undoubtedly excellent sound resistants, but no scientific test data has been made available to compare the sound insulating qualities of Oliver partitions with others to determine what, if any, advantages they possess over double metal lath partitions without an intervening membrane and without the plasterboard backing.

Rule 15. The better the edges of the partition are insulated from floors, walls and ceilings against which they abut, the more effective the partition functions as an insulator.

Tests show that best results are obtained by insulating the edges of the partition from the surrounding walls, floors and ceiling by means of felt or other shock absorbers such as cork, lead, etc. This point is important for music studios, bowling alleys, radio-broadcasting, etc., where entire freedom from conduction of sound through the floor slab or ceiling is desirable. The use of machinery cork under and over the partition along floors and ceiling is specially advantageous and recommended for important sound insulating jobs. See also Fig. 135.

Furthermore, great care must be exercised in the erection of any form of sound-resistive double partition to see that no part of it will touch piping, conduits, heat ducts, etc., which may form a similar contact with the other part of the construction and thus largely diminish the soundproofing advantages of the air space.

Rule 16. Cracks around door, window and ventilator openings in walls and partitions, the wood or glass panel in doors or partitions themselves and communicating pipes or conduits all transmit considerably more sound than the partition wall materials.

Tests by Professor H. Kruger of the Royal University at Stockholm showed that a 1¾-inch wooden door with ½-inch panels permitted as much sound to go through the center as a plaster panel weighing about 3 pounds per square foot (about ⅜-inch thick). Two doors mounted together and having ⅛-inch felt between when tested over the door crack, provided practically no resistance to transmission, it being equal to that of a plaster partition weighing approximately 1 pound per square foot. Equally unsatisfactory results were obtained for ⅛-inch thick single glass panels.

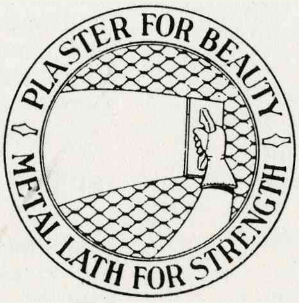
Professor Watson found that when a door was cut into a solid metal lath partition and installed with a 3/16-inch threshold opening, the relative intensity of sound transmitted through the partition jumped from 0.93 to 7.3 after the door was cut in, and up to 11.7 with an opening of ½ inch. He also found after constructing what were intended to be soundproof music rooms that sound was communicated by means of the ventilation system although it had been carefully installed. Ventilator ducts just below the ceiling line are frequently run the length of the building to vent toilet rooms in hotel buildings. No amount of insulation in the walls or partitions will in the slightest degree abate the transmission of sounds carried from room to room by this means. Similarly, pipes and conduits in the walls between rooms facilitate sound transmission, as do loose door bucks and trim.

Therefore it is manifestly unwise to use heavy sound-resistive construction in corridors and elsewhere where it is not feasible to do away with guarded openings. A balance should be struck tending to equalize the transmission through the partition material as compared with that through or around the openings. After that the choice should be made on the basis of space saving, weight, cost, freedom from sound-transmitting cracks, etc.

As a corollary, where freedom from sound transmission is of great moment, then the design should be such as to place all pipes, conduits, ventilating ducts, doors and windows in outside or non-communicating walls.

Section No. VII

Fire Retardation of Metal Lath



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Section No. VII

Fire Retardation

Importance of Partitions as Fire Barriers:

Fire resistive partitions and ceilings are recognized by fire departments and fire prevention authorities as an important link in the chain of barriers necessary to prevent the spread of fire. Their absence facilitates propagation of fire without check throughout the floor on which it starts; lack of partitions around stairways and elevator shafts permits fire to spread vertically and in turn laterally to completely envelope the whole structure.

Modern Building Codes Require Use of Fire-Resistive Partitions:

Profiting by experience in these fires in buildings erected before the present day principles of fire prevention had become well established, framers of modern building codes now require fire resistive partitions to be built into the structure so as to safeguard life and confine the fire to an area whose size is largely governed by type of occupancy and within which it can be readily brought under control by the fire department.

Fire insurance companies in determining the premium rate for building and for contents allow credits or place penalties, respectively, for the full use or lack of such partitions.

Instead of the hit or miss requirements of building ordinances of a decade or two ago, code writing has become scientific. Partitions, in common with other structural elements such as walls, columns and girders, are required to possess specific fire endurance—1, 1½ or 2 hour, etc., as the case may be, to provide resistance somewhat in excess of the probable duration of a fire at the particular part of the building in which the partition is located.

Bureau of Standards Rates Two-Inch Metal Lath Equivalent to Much Thicker Partitions:

S. H. Ingberg of the United States Bureau of Standards conducted a series of tests on metal lath and channel stud solid and hollow plaster partitions, October, 1929, with the following results:

The usual 1:2 sanded Gypsum plaster 2-inch solid partition was given the full one hour rating, the 1:2½ partition 2½ inches thick was rated 1 hour 10 minutes, while the 4½-inch hollow partition was given a 1¼-hour rating.

Later non-official tests on 2-inch wood fibre plaster (no sand content) indicated more than a 2-hour rating, from the standpoint of heat transmission, but this data was on small samples and will have to be confirmed on full size samples and be subjected to the water stream test, which it will undoubtedly pass.

This rating of 1 hour for a 2-inch solid metal lath and plaster partition places them on a par with thicker partitions of a masonry block, brick, etc.

The table shows the following minimum permissible thicknesses for a 1-hour rating:

3 inches for unplastered hollow gypsum, or cinder block, on solid reinforced concrete, or solid plasterboard and plaster.
4 inches for unplastered clay or concrete brick or hollow concrete block.
4 inches plus plastering both sides for hollow clay tile.
6 inches for 2-cell unplastered clay tile.

In a few instances greater ratings were accorded partitions listed above, but in most cases this was given on the basis of the addition of plaster, or greater thicknesses.

(Similar increased ratings are also obtainable with solid metal lath partitions of 3 and 4 inches thickness, but these are so seldom used that they have not been classified).

However, it is noteworthy that no other commonly used type of partition of the same thickness is given equivalent rating with 2-inch metal lath partitions.

Other Fire Tests Show Remarkable Endurance of Metal Lath:

Although the present American Standard Fire Test has governed all recent testing, building code officials also recognize some of the earlier tests, when made by well-known authorities. Among these were the late Professor Ira O. Woolson of the National Board of Fire Underwriters and Professor S. J. MacGregor of Columbia University. On July 21, 1910, two full-sized 2-inch gypsum and metal lath partitions were tested for 1 hour and successfully passed both fire and water stream tests under conditions even more stringent than present standards. Quoting from the test report, "No fire, smoke or water came through either partition during the test and they were firm and rigid after the test." In consequence 2-inch metal lath partitions were approved as "fireproof" and are permitted wherever fire-resistance of 1 hour is required by the codes.

On July 17, 1914, Professor MacGregor made a test on 2½-inch portland cement and metal lath plaster construction. After 3 hours of fire test the partition was subjected to a water test. No fire, smoke or water came through and it was accordingly given a 3-hour rating—the only construction other than heavy masonry to be accorded so high a rating.

Metal Lath Under the Baptism of Conflagration:

Not only under laboratory conditions but in the strenuous test of exposure in all sorts of fires have metal lath partitions demonstrated their remarkable endurance. Examples without number can be cited in which metal lath partitions have been commended by fire chiefs, insurance men and fire prevention authorities for having confined fires to the place of origin, or maintaining stairways and elevator shafts as safe havens of refuge and exit for occupants of buildings and of having prevented conflagrations.

Specific Code Recognition in Some of the Larger Cities:

Because of the authoritative fire tests cited and excellent performance under service conditions metal lath and plaster partitions are given special recognition in building codes throughout Canada. Examination of objects exposed to heat in actual fires and the amount of combustible contents shows that a fire corresponding in intensity with that of the 1 hour Standard Fire Test is about the maximum to be expected in office, apartment, hotel, hospital and similar occupancies; and codes are now requiring only 1 hour endurance for most partitions in such buildings. National Board of Fire Underwriters as well as other codes authorize the use of 2-inch solid partitions for corridors, public halls and division partitions.

Many of these codes specifically permit solid metal lath partitions for similar uses in non-fireproof buildings.

Comparison with Other Types of Incombustible Partitions:

Various types of masonry block partitions have likewise succeeded in passing fire test requirements and are justly approved by building codes, but in comparing them with the value of the reinforced solid or hollow metal lath partitions, it is important to note that metal lath constructions have no tendency to break up into parts as have the other types of partitions in many of the fires described.

Thus metal lath partitions have one invaluable property of fire resistance possessed by no other combination of materials; they can expand or contract without danger of dislodgment or spalling. This is particularly important in fires when the application of the fire stream causes sudden cooling of the hot partitions.

Many failures due to this cause were noted in the case of other types of partitions in the San Francisco fire. Lack of reinforcement in such partitions caused rapid spread of fire from room to room in the conflagration at the Pocasset Mills, 1928. In contrast, metal lath partitions in the same fires remained intact with negligible damage to their fire-retardent properties.

Metal lath partitions combine the advantage of the plaster as the fire retardent, with advantage of reinforcement throughout and the ability of this reinforcement to provide a mechanical bond and lengthen the fire-retarding value of the plaster coatings for a period long after they would have dropped off other bases, and become useless.

In comparing the various requirements of the Standard Fire Test with actual fire conditions one fundamental fact stands out. The most important test requirement is the ability of the partition to maintain its integrity against the actual penetration of fire and water. A partition satisfying this requirement when used around a stairway provides safe exit for occupants of a building, and a place from which to fight the fire; when used as a separation between rooms it confines fire to the room of origin. Unquestionably the larger percentages of communicated fires make headway through structural failure due to heat only or disintegration of the partition or ceiling under the combined action of fire and water rather than by heat conduction. This point is made because portland cement plastered metal lath partitions and ceilings, although not given so high a rating as gypsum block from the standpoint of heat conduction, have shown at least equal durability when exposed to actual fire. Undoubtedly this is why many insurance underwriters give preference to cement plaster on metal lath, and why building codes should give special recognition to its use in places—stairways, exits, corridor partitions and elevator shafts—where heat conduction is less important than rugged durability.

Metal Lath Protected Wood Studs and Joists Receive One-Hour Rating:

Space permits only brief mention of the 1-hour rating granted by the Underwriters' Laboratories to wood stud partitions when protected each side by ¾-inch of gypsum plaster applied on metal lath. This rating applies to both bearing and non-bearing partitions and is the highest rating accorded by the Underwriters for any combination of wood studs and plaster protection. This construction is required by building codes as a protection in many types of non-fireproof buildings. It is the most economical form of bearing partition, presents no special construction problems and is recommended as an ideal combination for use with non-bearing solid metal lath partitions. For low cost construction, both are recommended for use with wood joisted floors which have also received the Underwriter's 1-hour rating when protected by metal lath and plaster ceilings.

Comparative Fire Test:

On October 8, 1936, Professor W. L. Sagar of the University of Toronto conducted a comparative fire test on metal lath and plaster and plaster board and plaster. The purpose of the test was to determine the comparative merits of the two materials as a fire retardant. The following is a recapitulation of the report of Professor Sagar:

1. The heat transmitting properties of two-coat plaster board and plaster and two-coat metal lath and plaster are much the same.

2. The fire broke through the plaster board and plaster type of ceiling in 53 minutes. At no time did it appear through the expanded metal type of ceiling.

Although the temperature in the west side of the chamber was probably lowered when the fire broke through the east portion of the ceiling, the relative resistance of the covering materials is not thought to have been affected thereby.

3. The fire broke through the walls in one place only, namely, the plaster board observation panel in the west wall. This occurred in 59 minutes.

4. After quenching, it was observed that, viewed from the inside, the plaster board and plaster generally had been destroyed, while the metal lath and plaster generally was intact.

5. Generally, wooden studs facing the fire under metal lath and plaster were damaged less than those under plaster board and plaster.

6. The metal lath had operated to hold the web of plaster together, whereas the plaster applied to plaster board fell away very generally.

7. In consequence of this, for conditions existing in the test, the metal lath type of plastered wall and ceiling constitutes a much better barrier against spread of fire than the plaster board and plaster type does.

Fig. 136 shows the condition of the interior of the west wall of the test chamber after completion of the test. Note the complete destruction of the plaster board and plaster together with the charred 2 x 4-inch wood studs in the left side of the wall. The right side shows the plaster and metal lath still intact.

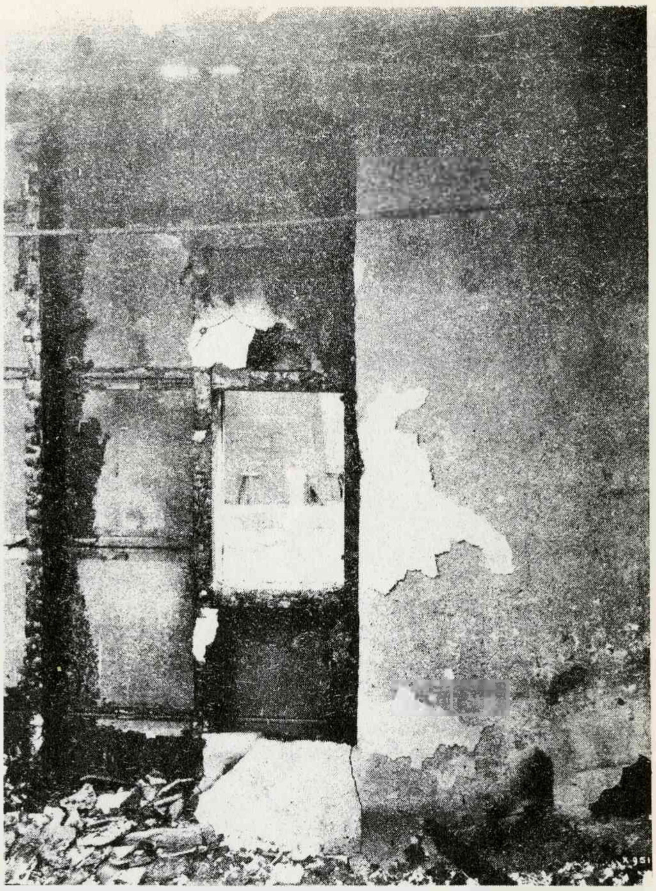

Fig. 136—Interior of West Wall.

The small window shown in the illustration is an observation panel which was covered with plaster board and plaster before starting the fire. A similar panel adjacent to the one exposed by the fire exists behind the metal lath and plaster which was not affected.

Protection of ceiling joist and structural steel is also of greatest importance as indicated in Fig. 137, showing the complete destruction of the plaster board type of ceiling in the test chamber. The fire broke through that type of ceiling in 53 minutes while the metal lath and plaster half was still intact at the end of the test.

Fireproof partitions of metal lath and plaster prevent spread of fire horizontally through a storey while metal lath and plaster ceilings prevent the fire from communicating vertically from one floor to another.

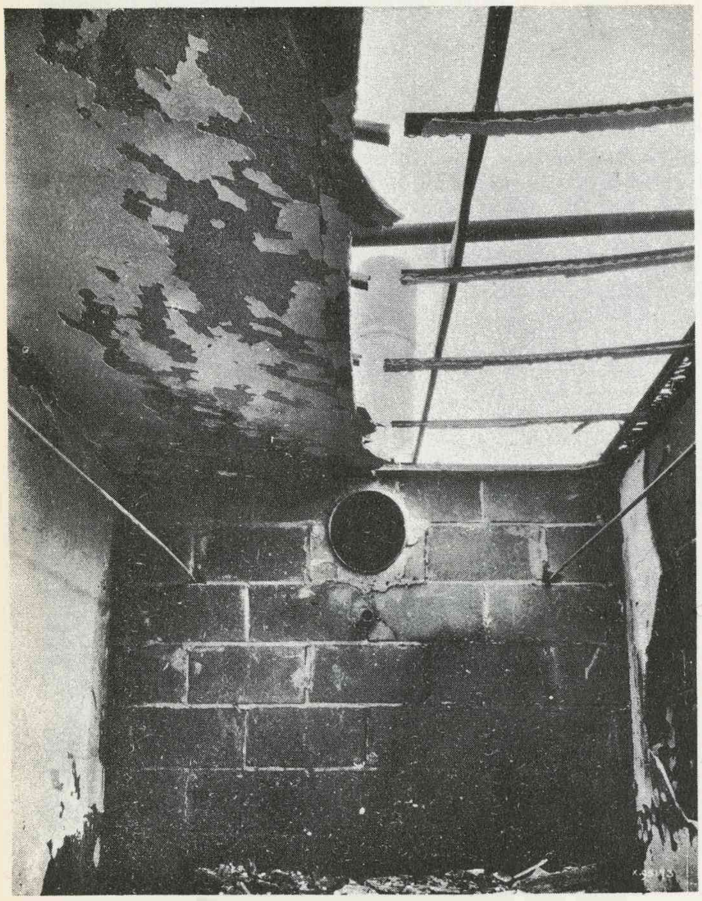

Fig. 137—(Left) Metal Lath and Paster Ceiling.
(Right) Plaster Board and Plaster Ceiling.

Fig. 138 shows a stairway completely destroyed by a recent fire in Toronto, Ont. Note that combustible lath had been used to enclose the only means of exit from the second storey. Had metal lath and plaster been employed, not one life would have been endangered and the damage to the building would have been much less.

Stair Wells and Ceilings:

Nowhere is the fire hazard as great as around stair wells and furnace rooms and for this reason those portions of the structure should be amply protected.

Many examples of disastrous fires are on record where an unprotected stair well has meant loss of life or serious injury to occupants of upper floors. Not only the enclosing walls should be constructed of fire-resisting materials but the soffits of stairs should also be protected against fire by the use of metal lath and plaster.

Approximately 90 per cent. of all fires originate inside a building and the greater number of these conflagrations start at the heating plant. A furnace room completely enclosed with metal lath and plaster walls and ceiling will provide an effective stop for a fire originating at that point. It is particularly recommended that the ceiling over heating plant be protected with metal lath and plaster.

Garages attached to residences are another form of fire hazard and too much stress cannot be placed on the importance of guarding against fire originating at that point. Many building codes throughout the Dominion require that all ceilings and walls around attached garages be protected with metal lath and plaster. This is particularly important where living rooms are situated over the garage. A garage protected in this manner will provide ample time for the exit of occupants and will lessen the damage to structural members from fire.

Frame Structures:

Stucco on metal lath over frame dwellings will provide a fire-resisting construction particularly suitable for the congested areas as well as rural districts.

Reinforced Portland cement stucco forms a concrete covering for the combustible wood framing timbers, thereby protecting them from fires originating in other buildings. Such construction forms absolute protection for the farm dwelling exposed to conflagrations starting in barns and outbuildings.

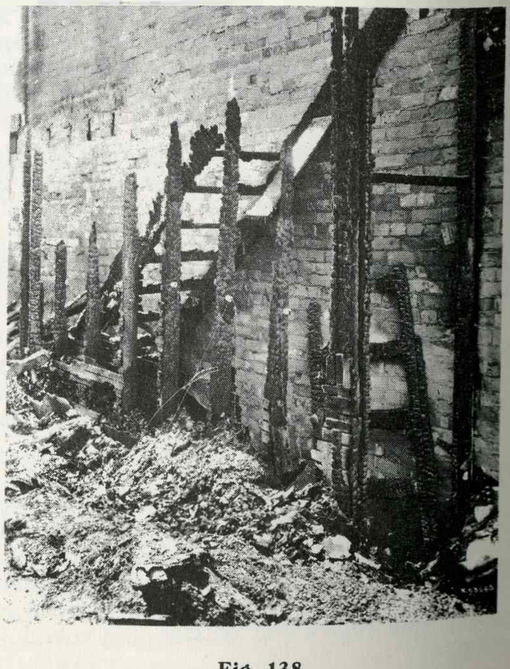

Fig. 138

Section No. VIII

Vibration and Impact—Adaptabilty—Details—Plastering

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Section No. VIII Part "A"

Resistance to Vibration and Impact

In almost every type of building partitions are subject daily to impact or shocks which may destroy them entirely or cause disfiguring cracks and hasten ultimate failure, and entail an outlay for repairs and redecoration which may prove a serious drain on income. Partitions are also extensively used for enclosing stair shafts and corridors and therefore, as necessary safeguards to life, their stability under extreme service conditions is of great importance.

Resistance to Cracking Around Door Openings:

Cracks frequently occur around openings in partitions because of the impact of slamming doors. However, investigation of hundreds of metal lath partition installations shows that adequate anchorage of the bucks to the floor and the correct details for casings and trim prevent such cracks. Architects and detailers of millwork have long since perfected these details and used them successfully in thousands of buildings. With these and the new type of concealed metal buck the construction measures up to the highest requirements for freedom from cracks around openings.

In metal lath partitions the lath reinforces the plaster at sides and top of openings right up to and under the casings and also makes a reinforced girder, continuous with the plaster at either side, for the portion from the top of the opening up to the ceiling. Masonry constructions are deficient in this respect so that many architects specify the use of strips of metal lath about 1 foot wide on both sides of masonry partition openings and diagonally across corners at top. In addition to this a steel-reinforced lintel must be provided at extra expense to carry the units over borrowed light partitions and others with long span openings. Even with these precautions the construction is unable to resist continued impact of closing doors, and cracks will frequently occur extending straight upward or diagonally from top of opening to ceiling. Many builders recognize the superiority of metal lath for this purpose by using it for the entire portion between the door head and ceiling, where masonry is used for the remaining portions. Similar conditions exist in partitions around pent-houses, elevator shafts and adjacent to crane runways where there is constant vibrating of moving machinery, and where metal lath partitions should be used because of their reinforced construction.

Accident Confirms Remarkable Resistance to Impact of Solid Metal Lath Partitions:

Some time ago Mr. F. R. Washburne of the Construction Department of Libby, McNeil & Libby, well known meat and food packers, designed a factory with a 2-inch solid cement plaster and metal lath partition 150 feet long and 16 feet high. Mr. Washburne narrates the following incident:

"About eight weeks after the erection of this partition the owners were moving machinery into the building and the workmen, in placing a large punch press, weighing approximately 5,000 pounds and about 8 feet in height, allowed it to tip over and strike this partition, resting against the same at an angle of about 40 degrees with the floor. I was surprised upon examination to find that the only damage to the partition was a slight dent in same, where the top of the press had struck."

Such cases as the above are common occurrences in warehouses, factories, machine shops, etc., where anything from heavy packing boxes, machinery, castings or safes may be accidentally dislodged and fall or be shoved against the partitions. In garages there is the impact of automobiles and in school rooms the jostling of pupils against partitions. For all these the toughness and resiliency of metal lath partitions, as described in the incident above, are specially suited.

Acid Test of Tornado and Hurricane Verifies Structural Superiority of Metal Lath Partitions and Walls:

Six square miles of the residential section of St. Louis were devastated by a tornado in September, 1927. In the destruction of the auditorium of the Central High School of that city, students found the only avenue of escape a corridor with partitions of 2 inches of solid metal lath and plaster. This remained intact despite the impact of tons of brick, steel and concrete which bent and slightly deflected but did not dislodge it, thus providing safe egress and saving the lives of the children. In many other instances in this tornado impacts entirely dislodged and destroyed partitions of ordinary construction and of masonry block.

The superior strength of metal lath reinforced construction was also strikingly demonstrated in the Florida hurricane of 1926. In the midst of the ruins of other types of construction, a Fort Lauderdale dwelling built with 2-inch metal lath cement plastered walls was certain refuge for those whose homes were destroyed.

Economical in first cost and with minimum upkeep, buildings of all kinds can be built in tornado country, with exterior walls and interior partitions of metal lath reinforced construction only 2 inches thick, with maximum safety against buckling, twisting, bending and racking. Such construction is recommended for residences, camp buildings, summer houses, farm structures, buildings in the oil fields, bridge-tenders' shanties, forest-fire watch towers, etc.

Solid Metal Lath Partitions Resist Explosion:

Resistance to explosion is an important requisite for partitions used as enclosures in factories and store-rooms, where explosives are used in manufacture, and in hospitals where storage is provided for highly inflammable x-ray and motion picture films.

"Metal lath partitions resisted explosion in a striking way in the explosion and fire which threatened plant some time ago.

"On the fourth floor of this five-storey building is a mixing room where nitro-cellulose compound is used. The south and west walls of this room are of brick, the north and east are constructed of metal lath on metal studs.

"The immense force developed by the explosion pushed out the exterior walls of the building, although they did not collapse. After the fire was over it was necessary to jack up the floor beams to let the walls come back into place.

"But the metal base and plaster partitions withstood the force of the explosion perfectly. Although the force of the explosion and the volume of fire in the room was great, none of the fire got beyond the partitions. When the fire department arrived at the scene it found the fire confined to the room where the explosion occurred and put out the fire, the sprinklers having been put out of commission by the explosion."

Ability to withstand both heat and explosive shock are necessary for the storage of nitro-cellulose materials. The National Board of Fire Underwriters had already given serious consideration to these hazards and had promulgated certain rules which if adhered to might have prevented the Cleveland holocaust.

The following is excerpted from the 1926 edition National Board of Fire Underwriters' Regulations for the Storage and Handling of Photographic and x-ray Nitro-cellulose Films and shows solid metal lath partitions rated second only to reinforced concrete.

"25. Vented Storage Rooms:

(a) Walls or partitions, floors and ceilings shall be of noncombustible material. Walls shall be continuous from floor to ceiling and shall be securely anchored. The following constructions have been found suitable. Others shown furnishing equivalent performance will be equally acceptable.

(1) Reinforced concrete.

(2) Metal lath with solid cement plaster not less than 2½ inches thick.

(3) Three-quarters of an inch cement or gypsum plaster on metal lath on each side of studs.

(4) Brick..........
(5) Tile........... Plastered on each side to a thickness of ¼ inch.
(6) Hollow Concrete Blocks......

Remarkable Record in Earthquakes Leads Engineers to Rate Metal Lath Partitions Second Only to Reinforced Concrete:

The resistance afforded by metal lath partitions against crack producing impacts is further illustrated by earthquakes where service conditions are notably severe because the entire structure is subject to settlement and racking stresses which are carried to floor and walls and thence into the partitions.

San Francisco Earthquake, 1906:

In this great disaster masonry partitions were either entirely destroyed or so badly twisted and cracked they had to be torn down and rebuilt, while the metal lath, although exhibiting an occasional crack, were repaired without difficulty and remained steadfast against the fire which ensued. This is only one of hundreds of instances where 2-inch solid and 4-inch hollow metal lath partitions survived both the 'quake and fire.

Porto Rico, 1918:

Notwithstanding that large quantities of metal lath had been used in the earthquake area, the Government Engineers reported no cases of destruction of plaster on metal lath, although numerous buildings were wrecked in this 'quake.

Inglewood, Hyde Park, California, 1920:

Regarding this 'quake of unusual severity, although metal lath was extensively used, Mr. C. A. Weatherby, Assistant City Engineer, reported that he had not found a single instance of fallen plaster where metal lath was used.

Tokio and Yokohoma, Japan, 1923:

No 'quake in recorded history has caused greater loss of lives and property. Wilbur S. Sample, Engineer for the Fuller Company, after inspecting a number of buildings which had been in the 'quake zone, reported as follows:[1]

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[1] Engineering News Record, Nov. 1, 1923.

"Interior Partitions

"* * * The hollow tile seems utterly unable to withstand the crushing effect of the lateral movement of columns, as evidenced by the crushing and falling of this class of partitions. * * * In certain localities where metal lath partitions were used these were more or less damaged, but this damage was not nearly so pronounced as in the hollow clay tile partitions.* * *"

"If impractical to use reinforced concrete partitions, the next best in the order named are metal lath on steel studs, solid brick, hollow brick, hollow clay tile. Reinforced concrete is, of course, recommended because of the additional stiffness awarded to the structure as a whole, but if this seems to be impracticable then use metal lath."

Santa Barbara, California—1925:

Here again, in vivid contrast to the ruins of masonry partitions and walls, metal lath construction stood in perfect shape and without a crack thus revealing its rugged integrity.

Earthquake Insurance Shows Value of Shatter-Proof Partitions:

With recurring tremors on the Pacific Coast, earthquake insurance has mounted until in 1927 it had reached the stupendous sum estimated at $600,000,000 and the premiums about $3,000,000 per year. Earthquake insurance, required by many investment houses before a Pacific Coast building loan will be financed, is so expensive that it has brought new policies with "deductible clauses" as high as 10% of the face of the policy.

"This means that a building insured for $1,000,000 under the 10% deductible clause must be damaged to the extent of $100,000 before the insurance company incurs any liability, the damage up to $100,000 being entirely to the account of the owner. * * * The deductible clause in a policy has a definite purpose. It makes the owner more careful of minor details in the construction of his building and relieves the insurance company of the annoyance arising from minor losses, such as fallen plaster or broken windows which may be due to shocks of moderate intensity."

Undoubtedly this is one reason why owners and builders in the earthquake zones who must assume the liability for the "first 10 per cent" are preferring metal lath partitions because of their well-evidenced structural stability.

Why Metal Lath Partitions Resist Vibration and Shock Better Than Others:

Two inches of solid plaster carried on and fully reinforced by a continuous network of steel lath attached to sturdy steel channels anchored to floor and ceiling makes solid partitions well-nigh invulnerable to impact or vibration. Compare this construction with masonry or block units that rely upon a problematical bond in carelessly filled mortar joints which are usually sadly deficient in resistance to shear and tension. They are seldom, if ever, anchored to floor and ceiling and when subject to sudden shock, crack and frequently collapse.

High compressive strength, an important property in bearing partitions and the strong point of masonry construction, is immaterial in non-bearing partitions which carry only their own weight. On the contrary, conditions involving resistance to tension and shear are often met with, and to resist these, solid metal lath partitions are admirably fortified with steel in both directions.

Plaster board constructions are merely plaster applied over pre-cast paper-reinforced plaster attached to light channel members. They are without a metallic key and bond for the plaster and therefore without the mechanical reinforcement considered necessary to successfully resist forces which tend to separate the plaster from the board or which cause cracks where plasterboard sheets meet at supports.

Finally, whatever type of plaster is used on solid partitions it is always troweled on, with each coat securely interlocked and inseparably bonded to the preceding ones, and is therefore a compact mass of greater density and strength than constructions made with poured-in place or unreinforced pre-cast units.

Section VIII Part "B" Adaptability

Because of their great strength as compared with their weight and thickness, metal lath partitions are generally better suited than others for subdivision of space, enclosing walls and general utility in many types of buildings and classes of occupancy. In order that the architect and builder may, with greatest convenience, determine the many places where metal lath construction can be used to greatest advantage in his own work, a bird's-eye view of the building field showing some of the principal uses for metal lath partitions is given in the following:

A—Office Buildings

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
(a) Borrowed light partitions in offices and along corridors.	(1) Metal lath and channel solid or hollow partitions are self-supporting without lintels or special construction over long glass and door openings as compared with special steel or heavy wood or concrete and steel-reinforced lintels required, at extra cost, to carry block or tile over openings or an *extra* charge for metal lath over such openings where tile and block is used either side. Without a reinforced lintel a crack will invariably form (when masonry is used) extending at each side from top of opening to ceiling.
(b) Over wide-cased openings between offices en suite.	(2) See No. 1.
(c) Around door openings.	(3) Metal lath reinforcing and metal studs which reinforce partitions adjacent to openings, resist impact of slamming doors better than thin masonry or plasterboard, because masonry is usually not anchored to ceilings and the board construction does not have the mechanical key for the plaster or the elasticity to absorb shocks and prevent cracks.
(d) For partitions subject to complete dismantling to meet needs of tenancy.	(4) As value of salvaged masonry blocks is *less* than labor required to salvage and clean them, and re-use made difficult by adherence of old mortar and plaster, and as metal lath partitions can be readily cut down and removed "en-masse," with salvage of channel studs, the net cost of removing metal lath partitions particularly the hollow type is no more than that of masonry types, and in many cases is less.
(e) For partitions subject to removal without destruction.	(5) Where partition is to be moved without destruction, and set up short distance away on same floor, metal lath partitions because they are 2-way reinforced can be moved and re-erected without breakage more expeditiously and economically than masonry or plasterboard constructions, neither of which are reinforced to meet such contingencies. (NOTE: It is recommended that all ceilings be plastered complete and floors finished before partitions are erected so that in event of change in location, ceiling and floors can be patched without showing former location—also use wood floor bucks or metal floor and ceiling channels to facilitate moving.)
(f) Cutting new openings for doors and closing up old ones.	(6) Because of self-supporting construction and no need for lintels (See No. 1) openings for new doors, etc., can be cut into existing metal lath partitions, and bucks, frame and trim set without special construction, lintels, etc., as required for masonry and plasterboard and metal partitions. Likewise, where old openings are to be closed new studs can be spliced to existing construction and metal lath and plaster applied with minimum loss of time.
(g) For general decorative use.	(7) Because of decorative possibilities of textured plaster on metal lath partitions they are superior to those built of panels of metal or wood for use in medical arts buildings, in law offices, in beauty salons, in offices used for merchandising jewelry, bric-a-brac, etc., and elsewhere where the beauty and decorative value of colored and textured plaster effects are desirable.
(h) For corridors with marble facing.	(8) Marble requires a strong setting base. Metal lath construction affords mechanical tie to channels in addition to either reinforced cement or gypsum. bond, therefore more satisfactory than on gypsum block or board partitions.

B—Hotels, Apartments, and Residential Occupancies

(a) Over wide openings such as on bed-closets, for door beds hung on doors, for cased openings between living room and kitchenette.	(10) Same reason as No. 1.

B—Hotels, Apartments and Residential Occupancies (Cont'd)

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
(b) Where space is to be divided into numerous small areas such as bed-closets, clothes closets, pantry cases, refrigerator space, etc.	**(11) Shallow depth of solid partitions yields greatest percentage of usable area. In small closets ⅜″ rib lath can be bent to form partitions without channel studs to reduce thickness and costs still further. Two or three inches makes or mars concealed-bed conveniences, or a cupboard for dishes, etc. Thick partitions are erected with considerable difficulty in small space, and consequently more expensive.**
(b) Where space is to be divided, etc. cont'd.	**(12) Plasterboard types of partitions are uneconomical where cut to fit in crowded quarters because of wastage and difficulty of erection due to special spacing of channels required.**
	(13) Experience shows it is easier to provide grounds and anchorage for steel shelving and steel cabinets on metal lath construction than on plasterboard types.
(c) For corridor partitions.	**(14) Because doors and openings under them offer much less resistance to sound passage from corridor to rooms than partition construction itself, there is no advantage in using thick heavy masonry for this purpose and space saving advantage of the 2″ partitions (which are equivalent in sound resistance to much thicker partitions) should be utilized.**
(d) For soundproof separations between apartments and between guest rooms.	**(15) Most satisfactory results can be obtained by soundproof double metal lath partitions (without cross-ties between) and these are cheaper, lighter and occupy less space than any other partition construction now available which has commensurate sound resistance.**
(e) Plaster arches over kitchenettes or for opening between kitchenette and living room, etc.	**(16) Arches of metal lath, channel and corner bead either 2 inches or 4 inches and upwards in thickness, now demanded by tenants, are most satisfactorily installed when placed between partitions of metal lath and plaster because of ease in tying to lath and channels.**
(f) Bathroom piping, bathrooms, and tiled kitchens.	**(17) Less space taken up and cheaper to fur bathroom piping in the clear on both sides with metal lath and channels than to cut masonry blocks to fit between piping. Blocks are only held together by plaster because cut up and impossible of anchoring to ceiling.**
	(18) If double row of blocks are used—one on each side to clear piping—they will take up 4¼ inches more space than double row of lath, plaster and channels. This is extremely wasteful as every inch counts doubly in a small bathroom where space is at a premium.
	(19) Metal lath can be readily furred away to form soundproof construction and to prevent sound transmission through adjoining bathroom walls. Sounds of flushing toilets, etc., are freely transmitted when masonry blocks are cut to fit between and touch piping which is connected to fixtures in adjoining rooms.
	(20) Wherever glazed encaustic tile is used on bathroom walls or kitchens it must be embedded in a portland cement base. This is applied most satisfactorily on metal lath, cannot be applied direct to plasterboard constructions, therefore, where tile is used it is most economical to make all bathroom walls and kitchens of metal lath construction, than to attempt to use two kinds of materials.
	(21) Channels in metal lath partitions offer more economical and permanent means of attaching kitchen sinks, etc., than do other partitions.
(g) Around steam piping.	**(22) Hollow metal lath partitions are preferred when necessary to enclose steam piping, as metal lath prevents swelling, warping, and cracked plaster, such as occurs when plasterboard is used.**
(h) Pipe chases in partitions.	**(23) Pipe chases cut through from face to face of masonry partitions, with small sections of masonry between and metal lath over face are not so strong, because masonry is not suitably anchored top and bottom, as is continuous hollow metal lath and channel construction which is anchored throughout to floor and ceiling.**
(i) Passenger elevator enclosures.	**(24) Enclosing walls of 2 to 3 inch solid metal lath reinforced plaster can be built entirely self-supporting, or supported from structural frame at each floor level when bearing walls are otherwise not required, and thus occupy minimum space.**
(j) Stair-shafts.	**(25) See No. 24.**

B—Hotels, Apartments and Residential Occupancies (Cont'd)

Part of Building, Etc.	Advantages of Metal Lath Partitions Compared to Other Types
(k) Dumb-waiter shafts.	**(26) As they require plaster only on one side they can be built self-supporting of channels and metal lath in space available more easily than mechanically possible with other fire-proof constructions.**
(l) For bearing partitions in non-fireproof buildings.	**(27) Wood studs protected with ¾" metal lath and plaster each side most economical bearing partitions to receive a one hour fire resistance rating by national fire prevention authorities, Bureau of Standards, Underwriters Laboratories and others.**

C—Factories, Mills, Mine Structures, etc.

Part of Building, Etc.	Advantages of Metal Lath Partitions Compared to Other Types
(a) Enclosures for belt-ways and material elevators and conveyors extending between floors.	**(30) Light weight, reinforced construction, fire retardance, resistance to explosion and vibration are advantages of metal lath over enclosures of masonry, plasterboard or wood sheathing. (See also Nos. 24 and 26.)**
(b) Enclosures for passenger and freight elevators and stairshafts as required by building code regulations.	**(31) See No. 30, also No. 24.**
(c) Separation between portions used for manufacturing and those used for offices.	**(32) Solid partitions can be built as high as 30 ft., and hollow as high as 32 feet without heavy pilasters such as required for masonry. By use of columns, etc., greater heights are permissible. Occupy minimum space and have excellent retarding properties. See also No. 30.**
	(33) Retard passage of noise from machinery, etc., from factory to office portion.
(d) Temperature retarding enclosures around heat-treating furnaces, etc.	**(34) See also No. 30. For great heat these partitions should be hollow or double, plastered with portland cement or wood-fired plaster and the interior filled with asbestos or other incombustible heat absorbing elements. Partitions can be built with series of single walls each separated from those adjoining by filled-in hollow space, giving maximum resistance to heat, explosion, or impact.**
(e) For enclosing rooms used for tumbling stampings, castings, etc., also for brick rattler test rooms, small arms testing, etc., and in general for noisiest parts of shops.	**(35) By using series of soundproof double metal lath and plaster partitions maximum resistance to sound transmission and to destruction by vibration is obtained. Freedom from noise promotes efficiency of employees in other parts of factory.**
(f) For shower stalls.	**(36) Use portland cement plaster. This construction has low cost, permanence, minimum expense upkeep.**
(g) For toilet stalls and wash rooms.	**(37) Same as No. 36. Cheerful, sanitary toilet towers or balcony toilets of solid partitions can be built adjoining crane runways without danger of cracking due to vibration of crane in adjoining bays, and require minimum structural support as compared with masonry which is subject to cracking under these conditions.**
(h) For penthouses, motor enclosures.	**(38) See Nos. 30 and 37.**

D—Hospitals, Sanitariums, Asylums, etc.

Part of Building, Etc.	Advantages of Metal Lath Partitions Compared to Other Types
(a) Soundproof dividing partitions between patients' rooms, around maternity wards, rooms for convalescents, for division of quarters for the insane within areas divided by masonry.	**(40) Use soundproof double metal lath partitions. See Reason No. 15.**
(b) Film storage rooms and cabinets.	**(41) Metal lath partitions are fireproof and shock and explosion-proof and recommended by Fire Underwriters. Cement plaster should be used. See also No. 30.**
(c) Dividing partitions between adjoining toilet and shower rooms.	**(42) Cement plaster should be used. Solid partitions for economy of space will stand moisture, can be kept sanitary by painting if necessary. Use metal base screed for combination with terrazzo base.**

D—Hospitals, Sanitariums, Asylums, etc. (Cont'd)

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
(d) Separate toilet rooms and shower rooms, clothes lockers.	(43) See Nos. 36 and 37. Plaster can be rounded at edges and intersections to prevent lodgment of disease germs.
(e) Cold storage rooms.	(44) Combinations of cork slabs used on solid metal lath partitions or ground cork with hollow metal lath partitions provides great flexibility in installation, minimum heat loss and very satisfactory external appearance.
(f) X-Ray rooms.	(45) Barium plaster applied over metal lath widely used for this purpose.
(g) Corridor partitions.	(46) See No. 14. Use metal base screed and picture mold for combination with terrazzo base; minimum upkeep. Ceiling acoustical treatment most economical.

E—Schoolrooms, Music Rooms and Radio Broadcasting Studios, Rooms for Recording Sound Pictures (Talkies), Etc.

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
(a) Partitions in school rooms and for school-room corridors.	(50) Either natural or artificial slate blackboards readily installed on solid or other types of metal lath partitions. Lath and channel reinforcement provides necessary resistance to rough usage. (51) Metal lath partitions accorded one to three hour fire retardance by Building Code Regulations assures maximum protection at minimum cost for non-bearing fire separations along corridors, around stairways, etc. Metal lath protected wood studs for bearing partitions recommended for all non-fireproof school buildings.
(b) Partitions and walls of rooms used for instruction in music, for radio broadcasting, etc.	(52) Soundproof double metal lath partitions are cheaper, lighter and occupy less space than other types of partitions or walls used to segregate such rooms from other parts of the building.
(c) For locker recesses.	(53) Lath and channel recesses to provide locker space in corridors can be built more economically than other constructions which require heavy supporting members.

F—Theatres, Assembly Halls and Lodge Rooms

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
a) Motion Picture Booths.	(54) Light weight, metal lath and portland cement or gypsum plaster on small channels or angles is fire and explosion proof, offers maximum protection to audience and operator, and can be hung from overhead trusses or as balcony. It is approved by National Board of Fire Underwriters and principal building codes of the United States.
(b) Fan rooms and ventilating ducts.	(55) Light weight and fire resistive metal lath partitions require no painting upkeep for this use, occupy smaller space and cost less.
(c) Dressing rooms.	(56) Used for space saving, etc.
(d) Proscenium walls.	(57) Channel and lath construction facilitates adaptation to architectural design, and can be built to great heights with minimum weight and without heavy supporting construction such as required for masonry.
(e) Exit stairway protection.	(58) Economy of space, etc., minimum weight, fire safety. See No. 30.
(f) Film Storage rooms and cabinets.	(59) See No. 41.

G—Miscellaneous Buildings

Part of Building, etc.	Advantages of Metal Lath Partitions Compared to Other Types
(a) Shower and toilet rooms for summer homes, camp building, etc.	(60) With portland cement plaster, metal lath and channels make permanent crack-proof construction which will stand moisture and settlement better than average hollow clay products, is cheaper and lighter than concrete blocks, etc., and takes up less space than any comparable construction except more expensive slate, or metal which require continual upkeep. For toilet stalls construction is self-supporting, will stand much abuse and requires minimum upkeep.
(b) Exterior walls of tourist camps, small garages, and manufacturing plants.	(61) See No. 60. Makes entire building depreciation proof. Resists tornado effectively. See also No. 63.
(c) In earthquake regions.	(62) Greater resistance to earthquake shock than any but reinforced concrete was shown in California and Japan; when subject to shock, damage is much less than to masonry, and can be repaired at less expense.

Section VIII Part "C"

Special Installation Details

There are hundreds of uses for 2-inch metal lath partitions, some of which require construction slightly out of the ordinary. This chapter describes construction details for a few of these special places about the apartment building, office, manufacturing plant or school, etc., where the use of metal lath partitions is particularly advantageous.

Stairshaft Enclosures:

Fig. 139 shows a very satisfactory method of building a fireproof enclosure for stairwells at minimum expense. Solid metal lath and plaster was used. In this case the structural framing is steel. Complete details are shown in Fig. 140, Page 146, and the manner of framing-in to the steel is shown in Section "E-E" in Fig. 141, Page 146. Note that the partition, made 2½ inches thick for this use to provide special safety in fire, can be run from floor to ceiling independently of the stair construction, or where it is desirable to make stair stringer flush with partition, it can be framed into the channel stair stringer from above and below. The same general details are used in concrete or wood framing, the former being shown in Fig. 142, Page 147, Detail "A." For hollow partitions around stairways see Fig. 142, Page 147. Hand rails and balustrades are also readily built of 2-inch solid plaster, Fig. 142, Page 147, Detail "B". Where space within the shaft is at a premium, channel studs may be omitted and heavy rods used instead to make a partition about 1½ inches in thickness.

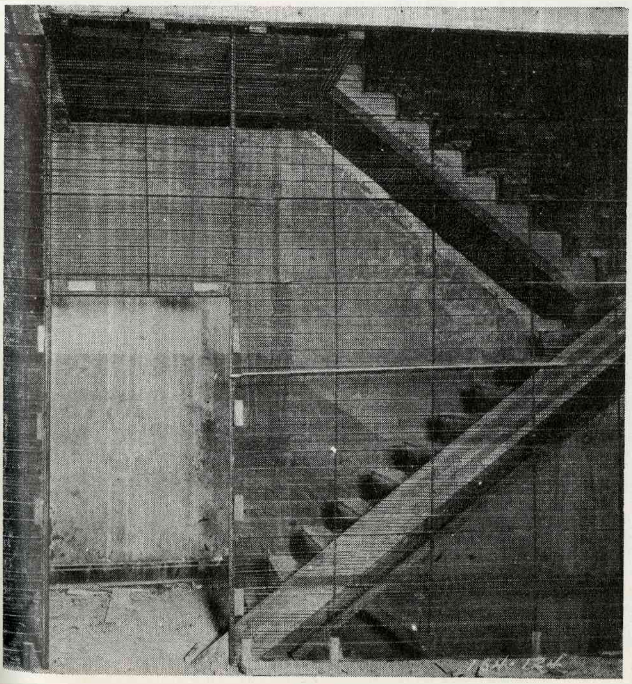


Fig. 139—Fire-Resistive Stairway Enclosure 2-inch Solid Metal Lath and Plaster.

Elevator Enclosures:

Details for elevator enclosures are much the same as for stairways, those shown in Fig. 141, Page 146, being typical. For this purpose, likewise,, 2½-inch partitions should be used, while for heights over 16-ft. 2¾ or 3-inch thicknesses are recommended for this use; or hollow metal lath partitions can be used. Both types of enclosing partitions are shown, also several ways in which to finish the inside of the shaft at the entrance door on each floor. Self-supporting elevator shafts with 2½-inch solid partition curtain walls are readily built and as shown by the test of actual fire described will stand when the remaining construction fails. Necessary openings in such shafts should be closed preferably with tin-clad wood doors of the type which serve as safety gates as well. Where space does not permit installing such doors, rolling steel shutters operated by a fusible link should be used.

Factory Dividing Partitions:

Factory unit partitions are useful, since they isolate points of greatest fire and explosion hazard from other departments. For such purposes as the construction of bins to contain inflammable stock, the segregation of wood-working machines, construction of lacquer rooms, etc., metal lath partitions are largely used in manufacturing works.

Either solid or hollow partitions may be used. For temperature separations, wood-fibred plaster is recommended, and for extreme heat, hollow partitions with the space filled with Sil-o-Cel, asbestos, etc., will be found very satisfactory. Safety of valuable factory records is assured by a fireproof metal lath partition enclosure.

Metal Lath partitions are useful too in isolating the noisy departments from the office portion, thereby increasing the efficiency of the office employees. Plastering on opposite side of the dividing partitions can be varied to suit the occupancy. Solid partitions can be installed in any length, and to any height ordinarily encountered in the factory building.

Belt and Shaftway Enclosures:

Belt and shaftways when not properly enclosed are frequently the cause for rapid fire spread in factory buildings even when the structure is

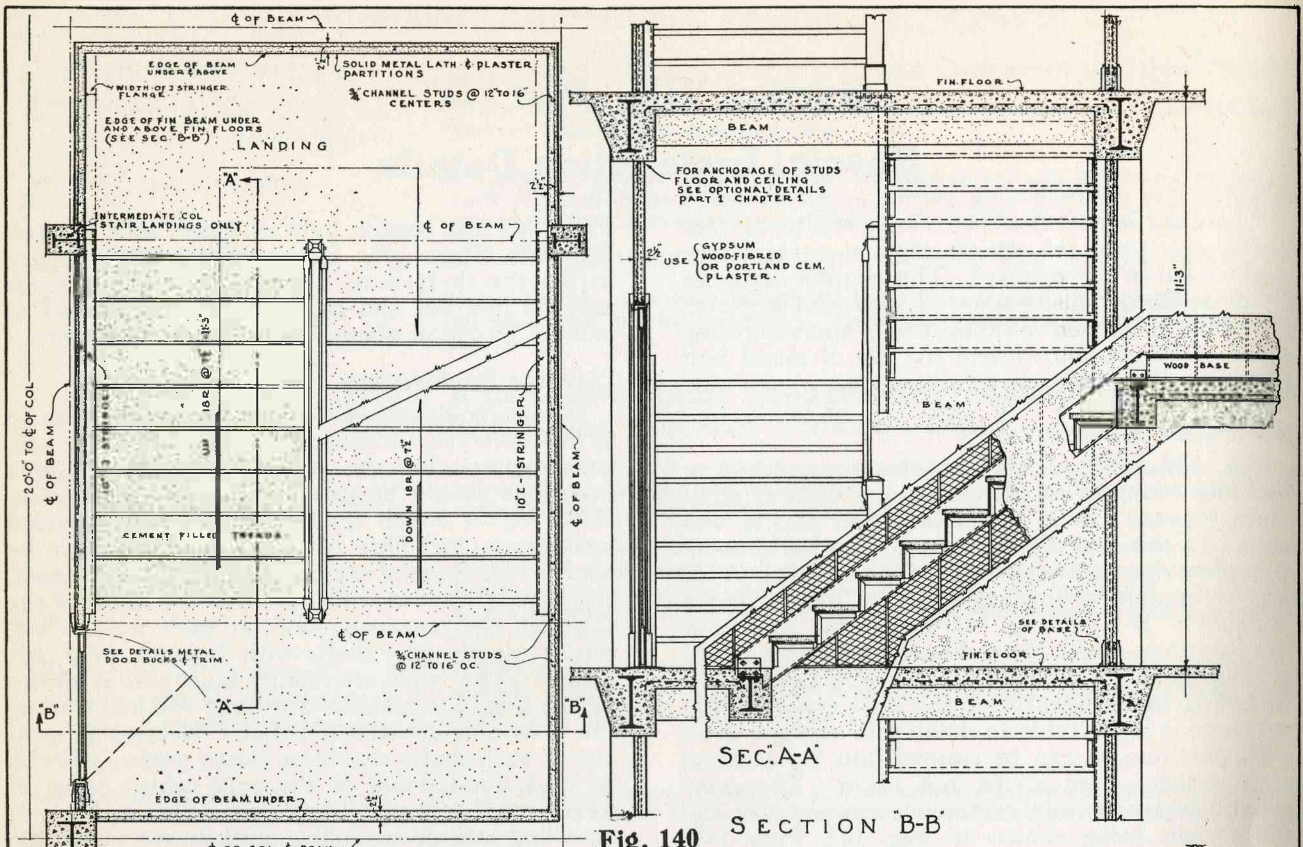
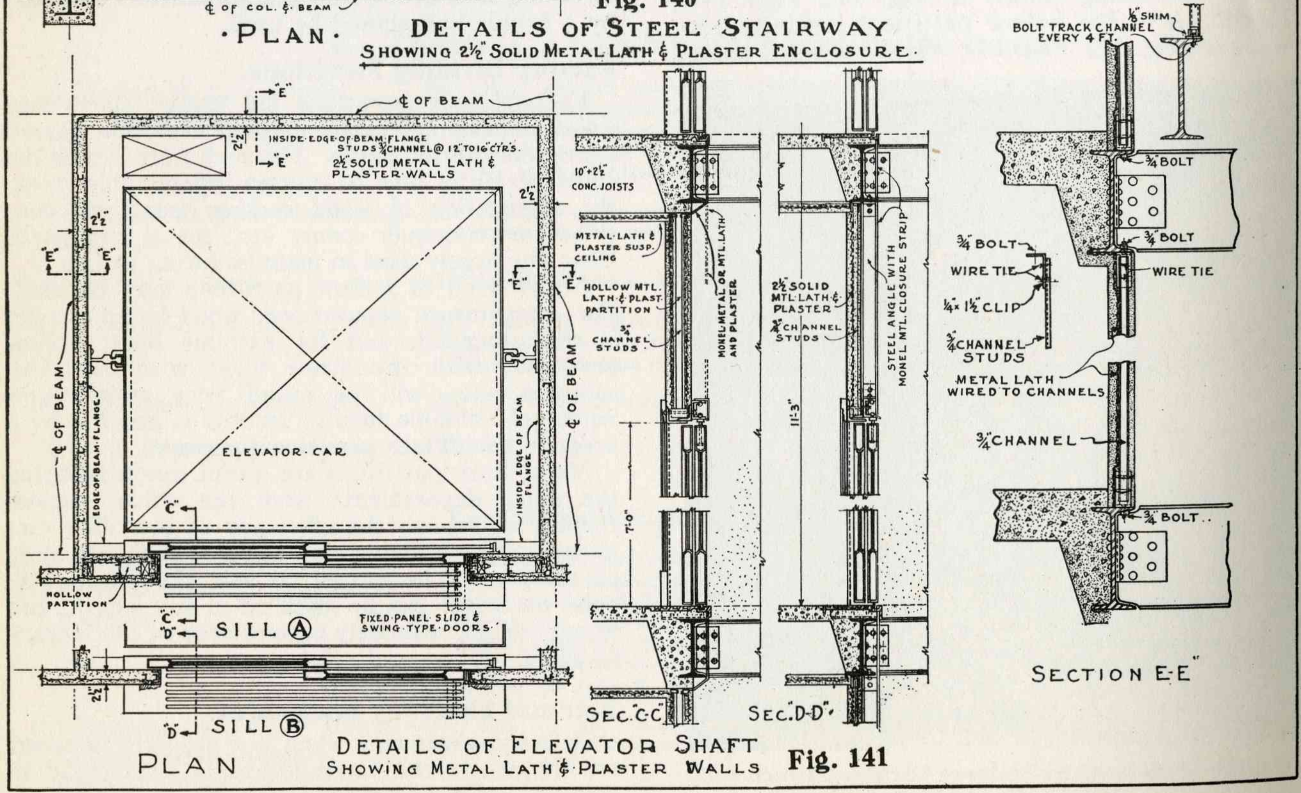

℄ OF BEAM
EDGE OF BEAM UNDER & ABOVE
2½"
SOLID METAL LATH & PLASTER PARTITIONS
WIDTH OF 3 STRINGER FLANGE
¾" CHANNEL STUDS @ 12" TO 16" CENTERS
EDGE OF FIN. BEAM UNDER AND ABOVE FIN. FLOORS (SEE SEC. "B-B")
LANDING
"A"
INTERMEDIATE COL STAIR LANDINGS ONLY
℄ OF BEAM
20'-0" TO ℄ OF COL
℄ OF BEAM
10" C - STRINGER
18R @ 7½"
DOWN 18R @ 7½"
10"-C STRINGER
CEMENT FILLED TREADS
℄ OF BEAM
SEE DETAILS METAL DOOR BUCKS & TRIM
¾" CHANNEL STUDS @ 12" TO 16" O.C.
"B"
"B"
EDGE OF BEAM UNDER
℄ OF COL. & BEAM
·PLAN·
FIN. FLOOR
BEAM
FOR ANCHORAGE OF STUDS FLOOR AND CEILING SEE OPTIONAL DETAILS PART 1 CHAPTER 1
2½" USE GYPSUM WOOD-FIBRED OR PORTLAND CEM. PLASTER
11'-3"
WOOD BASE
BEAM
SEE DETAILS OF BASE
FIN. FLOOR
BEAM
SEC. "A-A"
SECTION "B-B"

Fig. 140

DETAILS OF STEEL STAIRWAY
SHOWING 2½" SOLID METAL LATH & PLASTER ENCLOSURE.


℄ OF BEAM
"E"
INSIDE EDGE OF BEAM FLANGE
STUDS ¾" CHANNEL @ 12" TO 16" CTRS.
2½" SOLID METAL LATH & PLASTER WALLS
2½"
"E"
ELEVATOR CAR
℄ OF BEAM
EDGE OF BEAM FLANGE
INSIDE EDGE OF BEAM FLANGE
℄ OF BEAM
"C"
HOLLOW PARTITION
FIXED PANEL SLIDE & SWING TYPE DOORS
"C"
"D"
SILL Ⓐ
"D"
SILL Ⓑ
PLAN
10"+2½" CONC. JOISTS
METAL LATH & PLASTER SUSP. CEILING
HOLLOW MTL. LATH & PLAST. PARTITION
¾" CHANNEL STUDS
MONEL METAL OR MTL. LATH AND PLASTER
7'-0"
SEC. "C-C"
2½" SOLID MTL. LATH & PLASTER
¾" CHANNEL STUDS
11'-3"
STEEL ANGLE WITH MONEL MTL. CLOSURE STRIP
SEC. "D-D"
⅛" SHIM
BOLT TRACK CHANNEL EVERY 4 FT.
¾" BOLT
¾" BOLT
¾" BOLT
WIRE TIE
WIRE TIE
¼" x 1½" CLIP
¾" CHANNEL STUDS
METAL LATH WIRED TO CHANNELS
¾" CHANNEL
¾" BOLT
SECTION E-E"

DETAILS OF ELEVATOR SHAFT
SHOWING METAL LATH & PLASTER WALLS

Fig. 141

Figs. 140 and 141—Stairway and Elevator Shaft Details

MISCELLANEOUS DETAILS

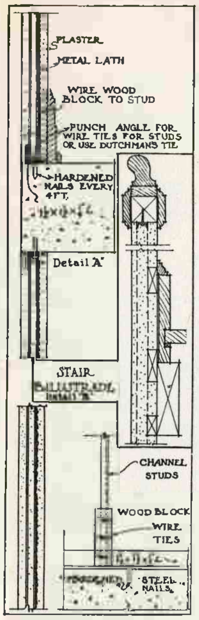


Fig. 142
Stairway Enclosure and Balustrade.

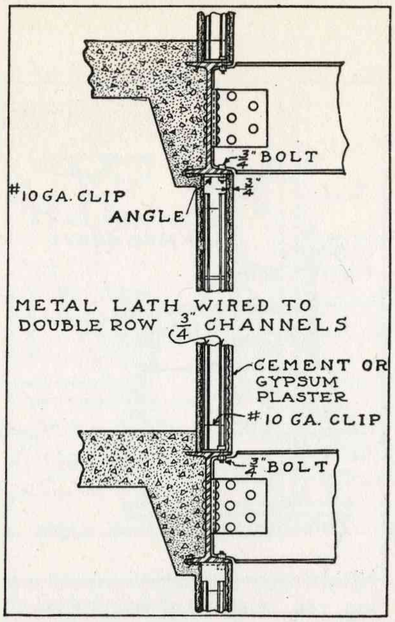


Fig. 143—Detail Hollow Metal Lath Partition Stairway Enclosure.

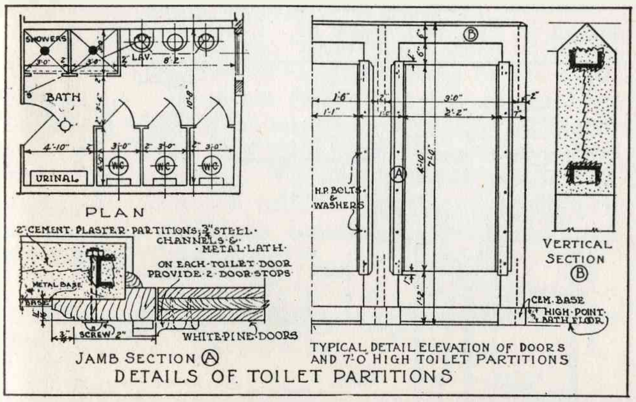


Fig. 146—Toilet Room Partitions of Solid Metal Lath and Plaster.

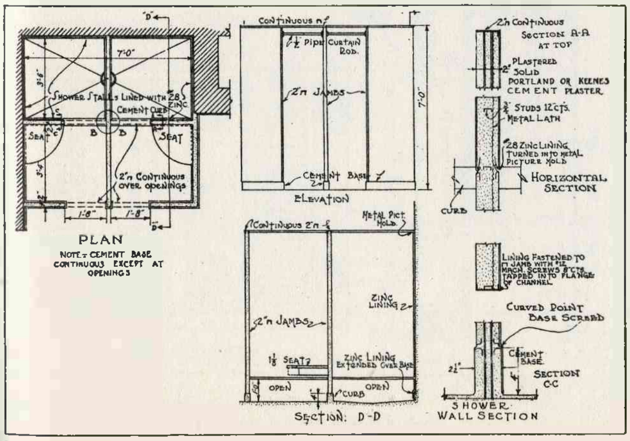
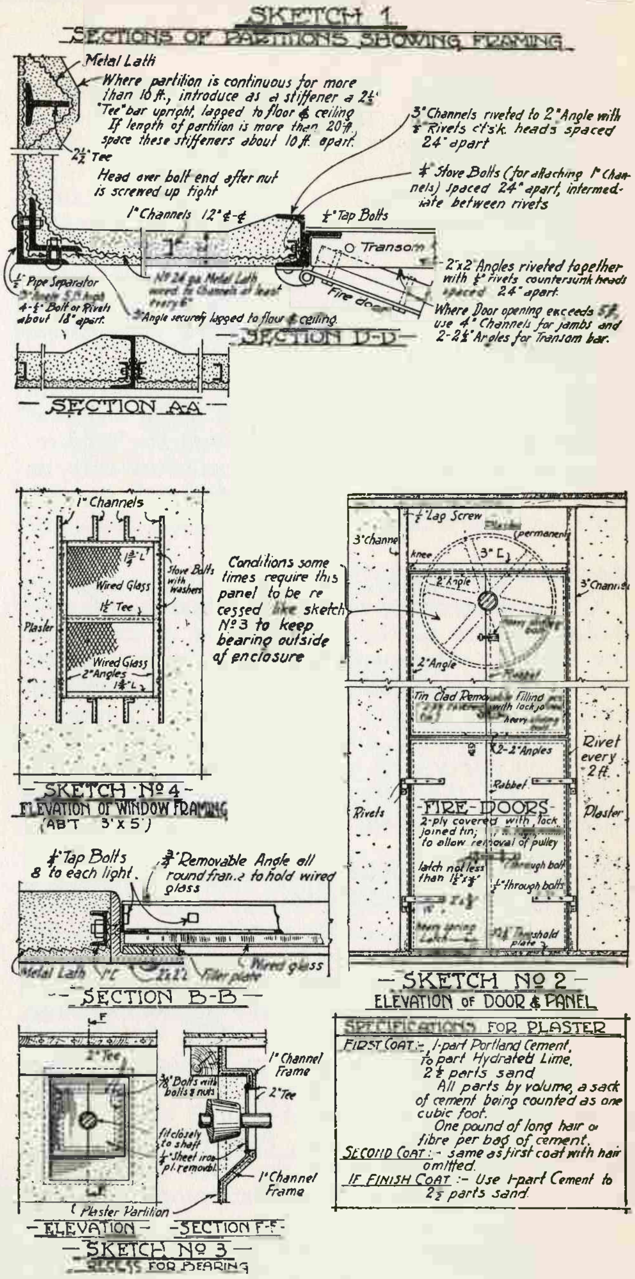


Fig. 147—Metal Lath and Cement Plaster Shower Room Detail.


SKETCH 1.
SECTIONS OF PARTITIONS SHOWING FRAMING
Metal Lath
Where partition is continuous for more than 10 ft., introduce as a stiffener a 2½" "Tee" bar upright, lagged to floor & ceiling. If length of partition is more than 20 ft. space these stiffeners about 10 ft. apart.
2½" Tee
Head over bolt end after nut is screwed up tight
1" Channels 12" ¢-¢
½" Tap Bolts
3" Channels riveted to 2" Angle with ⅜" Rivets c'ts'k. heads spaced 24" apart
¼" Stove Bolts (for attaching 1" Channels) spaced 24" apart, intermediate between rivets
Transom
2"x2" Angles riveted together with ⅜" rivets countersunk heads spaced 24" apart.
½" Pipe Separator
4-½" Bolt or Rivets about 18" apart.
Nº 24 ga. Metal Lath wired to Channels at least every 6"
Angle securely lagged to floor & ceiling.
Fire door
Where Door opening exceeds 5 ft. use 4" Channels for jambs and 2-2½" Angles for Transom bar.
SECTION D-D
SECTION A-A
1" Channels
1¾" L
Wired Glass
1½" Tee
Stove Bolts with washers
Plaster
Wired Glass
2" Angles
1¾" L
Conditions some times require this panel to be recessed like sketch Nº 3 to keep bearing outside of enclosure
SKETCH Nº 4
ELEVATION OF WINDOW FRAMING (ABT 3'x5')
¼" Tap Bolts 8 to each light.
¾" Removable Angle all round frame to hold wired glass
Metal Lath
1" C
2x2 L
Filler plate
Wired glass
SECTION B-B
½" Lap Screw
(permanent)
3" Channel
knee
3" L
2" Angle
3" Channel
2" Angle
Tin Clad Removable Filling with lock joint
2-2" Angles
Rivet every 2 ft.
Rabbet
Rivets
FIRE-DOORS
2-ply covered with lock joined tin; to allow removal of pulley
latch not less than 1½"x⅜"
through bolt
½" through bolts
Threshold plate
Plaster
SKETCH Nº 2
ELEVATION OF DOOR & PANEL
F
2" Tee
⅜" Bolts with bolts & nuts
1" Channel Frame
2" Tee
fit closely to shaft
¼" Sheet iron pl. removable
1" Channel Frame
Plaster Partition
ELEVATION
SECTION F-F
SKETCH Nº 3
RECESS FOR BEARING

SPECIFICATIONS FOR PLASTER

FIRST COAT:— 1-part Portland Cement, ⅛ part Hydrated Lime, 2½ parts sand. All parts by volume, a sack of cement being counted as one cubic foot. One pound of long hair or fibre per bag of cement.

SECOND COAT:— same as first coat with hair omitted.

IF FINISH COAT:— Use 1-part Cement to 2½ parts sand.

Fig. 144—Solid Metal Lath and Plaster Belt and Shaftway Enclosures.

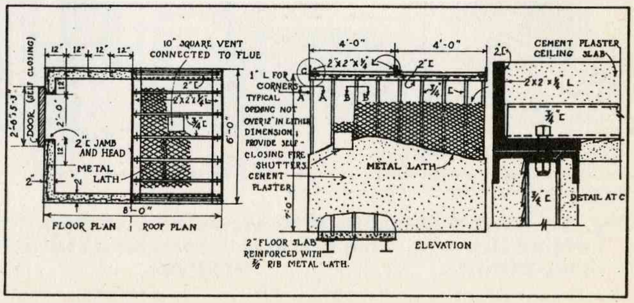


Fig. 145—Solid Metal Lath and Plaster Motion-Picture Booth.

sprinkler-protected. The records of their use in mills in which fires have occurred have demonstrated their excellent retardant properties. Such enclosures may be of the vertical or inclined type, and they present a slightly different problem than that of the protection of stairwells and elevator shafts. Protection is given and yet the belt or bucket elevators readily accessible through metal doors, hung on steel angle bucks bolted to the adjacent stud. A wire glass window is provided for observation. (Fig. 144, Page 147.)

Inclined beltways from one floor to another are protected in the same manner, the metal lath and plaster partitions being framed to suit the requirements in the usual way, or the enclosure may be given its own slanting ceiling, framing it in with heavier channels when necessary.

Motion Picture Booths:

All building codes require that motion picture booths because of the great hazard of exploding film be built of fireproof and explosion-proof construction. Metal lath construction is specially recognized as suitable for this use. Thousands have been built of solid metal lath and plaster. Maximum safety with minimum weight and moderate cost are thus assured. Framing details are shown in Fig. 145, Page 147.

Toilet, Shower, Locker Room and Lodging House Partitions:

Stalls for shower, toilet and locker rooms are easily built with the 2-inch partitions. Ordinary ¾-inch studs are the framework, the exposed edges being finished with a trowel as in Fig. 146, Page 147, or a 2-inch channel frame into which the channel studs are bolted, can be used as in Fig. 147, Page 147. The construction is shatter proof and can be given an excellent and desirable finish with Keene's cement plaster. In Fig. 147, Page 147, the shower stalls are lined with sheet zinc (see detail). For semi-exposed places as in tourist camps, portland cement plaster should be used. Doors are readily hung on these partitions, see Jamb—Section A, Fig. 146, Page 147.

Another type of Shower-room construction is shown in Fig. 100, Page 87. Corners of the frame.

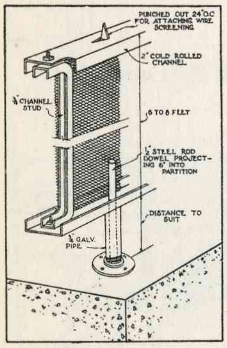

PUNCHED OUT 24" O.C. FOR ATTACHING WIRE SCREENING
2" COLD ROLLED CHANNEL
¾" CHANNEL STUD
6 TO 8 FEET
½" STEEL ROD DOWEL PROJECTING 6" INTO PARTITION
DISTANCE TO SUIT
¾" GALV. PIPE

Fig. 148—Detail of Lodging House Compartment.

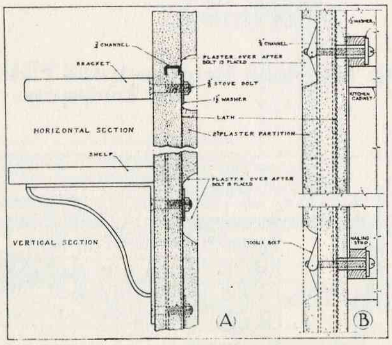


Fig. 149—Attachment of Shelving Brackets to Solid Metal Lath Partitions.

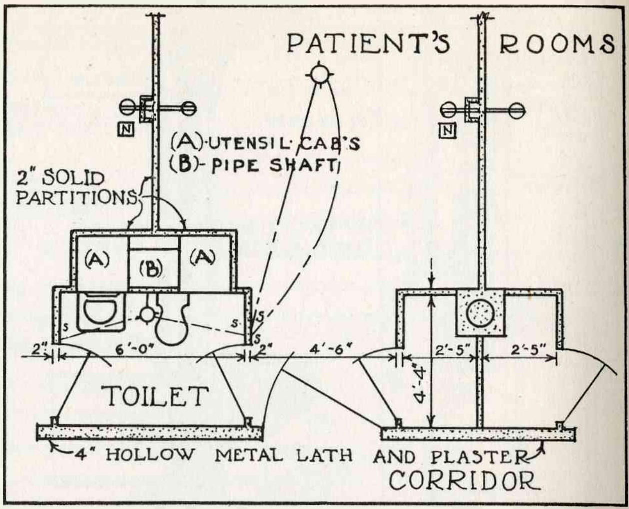


Fig. 150—Two-Inch Metal Lath Toilet Room Partitions in Hospital Buildings.

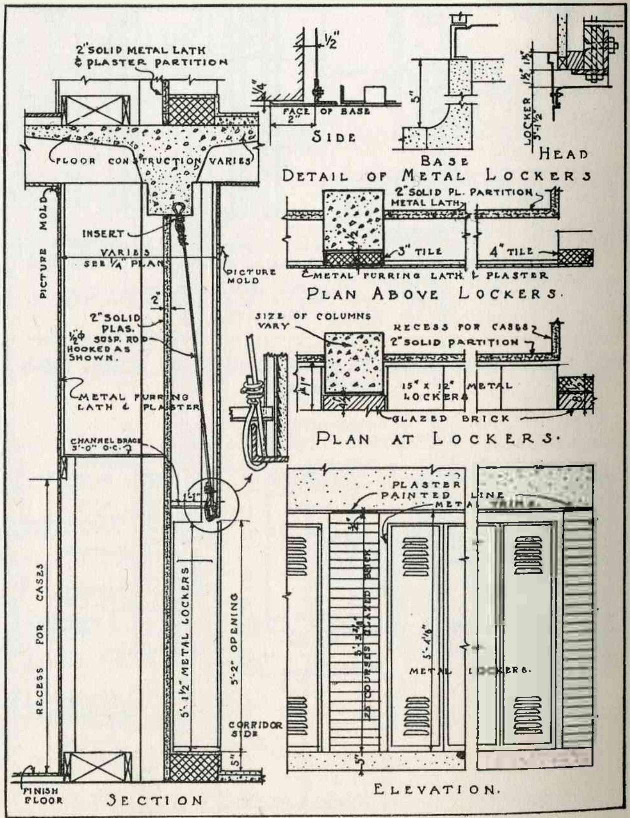


Fig. 151—Metal Lath Construction for Schoolroom Wall Cases and Lockers.

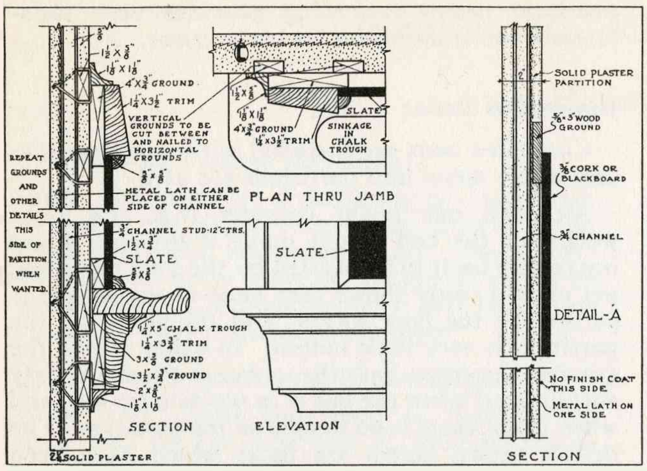


Fig. 152—Details for Attachment of Natural Slate Blackboards to Two-Inch Solid Partitions.

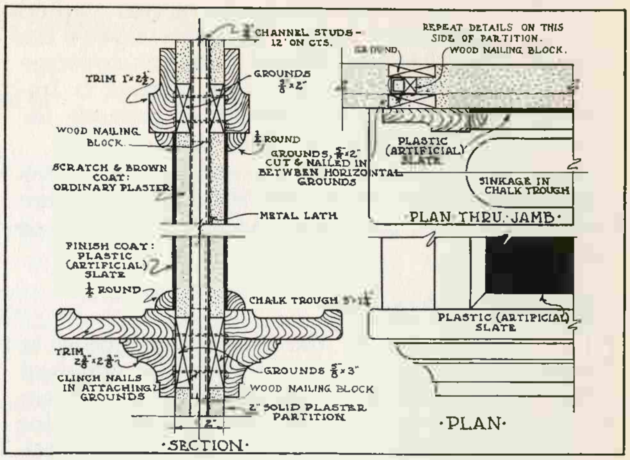

¾" CHANNEL STUDS – 12" ON CTS.
TRIM 1"×2½"
GROUNDS ⅝"×2"
WOOD NAILING BLOCK.
½ ROUND
GROUNDS, ⅝"×2" CUT & NAILED IN BETWEEN HORIZONTAL GROUNDS
SCRATCH & BROWN COAT: ORDINARY PLASTER
METAL LATH
FINISH COAT: PLASTIC (ARTIFICIAL) SLATE
½ ROUND
CHALK TROUGH
TRIM 2⅝"×2⅝"
CLINCH NAILS IN ATTACHING GROUNDS
GROUNDS ⅝"×3"
WOOD NAILING BLOCK
2" SOLID PLASTER PARTITION
2"
·SECTION·
REPEAT DETAILS ON THIS SIDE OF PARTITION.
GROUND
WOOD NAILING BLOCK.
PLASTIC (ARTIFICIAL) SLATE
SINKAGE IN CHALK TROUGH
PLAN THRU. JAMB·
PLASTIC (ARTIFICIAL) SLATE
·PLAN·

Fig. 153—Details Showing Application of Artificial Slate Blackboards to Two-Inch Solid Partitions.

are of galvanized iron pipe. Space for shower piping is provided by chases formed between two channels covered each side with metal lath. A 4-inch concrete curve provides a 1-inch slot into which the channel studs are grouted.

Lodging houses are required by many cities to have fire and germ-proof separations of the compartments. These are frequently only about 5 by 7 feet, and partitions must be off of floor for cleaning (see Detail Fig. 148), and for economy stop short of the ceiling. For privacy a wire screen is put over the top of each compartment. Two-inch metal lath partitions are being extensively used for this purpose.

For toilet rooms in hospitals and institutional buildings the arrangement shown in Fig. 150 has been found very compact.

Kitchen Cabinets, Shelving and Miscellaneous Wall Hung Devices:

Perhaps the best method is to carry the shelf on brackets as in Fig. 149A. These are easily hung by first punching a hole through the partition and bolting the bracket to the partition by means of a ⅜-inch flat head stove bolt with a 1½-inch washer against the lath. The washer and the nut are then plastered over and entirely concealed. This work should be done before finish plaster is applied. When carrying considerable weight the bolt should be located preferably next to a stud. For shelving or other devices attached back to back, the bolt extends through the partition and no washer is needed.

Another method is to punch a slightly larger hole through partition and use a spring toggle bolt to

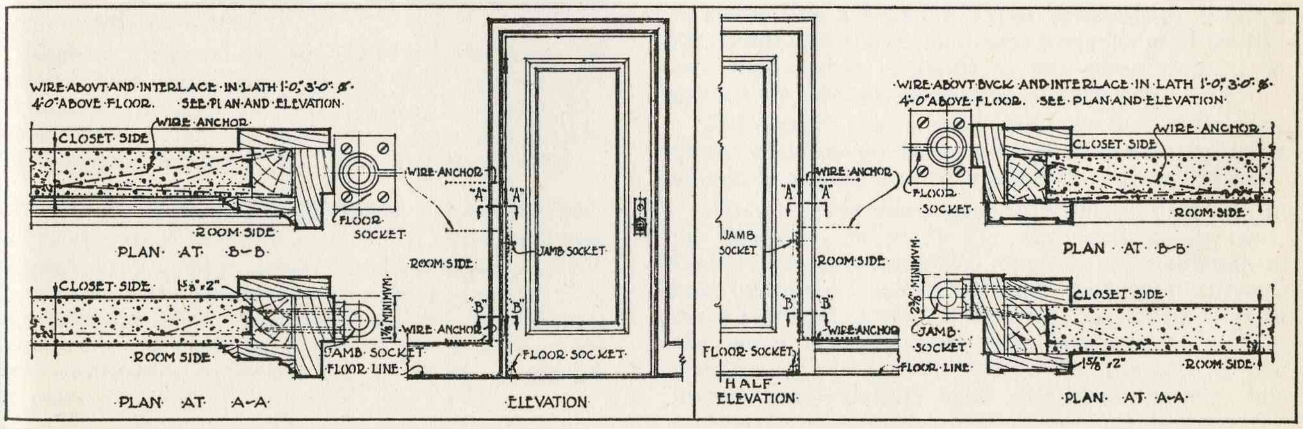


Fig. 154—Typical Buck and Jamb Constructions for Installation of Concealed Beds Attached to Partition of Two-Inch Solid Metal Lath and Plaster

carry the bracket. The advantage of this method is that it requires no nut on the other side of the partition, and therefore allows a thicker coverage of plaster on the back side. This method is frequently used for the attachment of grounds for wall-hung kitchen cabinets. (Fig. 149B.)

Heavy pictures are hung, on metal lath partitions which have no picture mould, by means of Moore Pushless Hangers procurable at any hardware or variety store.

School Room Details:

The growing use of the shallow partition in schools has led to the development of standard methods of attachment for blackboards, etc. These are shown in Fig. 152 and 153, Page 149, for natural and artificial slates respectively. Both horizontal and vertical grounds are used. Having the grounds permanently tied to the channel frame the blackboard is securely anchored to the partition. Note that grounds, etc., can be repeated on what is shown as the plain side of the partition in Fig. 152 so that blackboards can be installed on both sides.

Hollow and soundproof double partitions are also being used for school room blackboards. The details are identical with those just described except that a double row of channels is used connected for hollow partitions, and entirely separate for the soundproof type except where insulated connecting construction is used.

Schoolroom wall cases and lockers lend themselves especially well to construction with metal lath partitions. Even when the principal partitions are of masonry, a metal lath curtain wall hung from overhead beams or ceiling provides very satisfactory construction for locker recesses.

Concealed Beds:

Concealed beds are installed with complete success where metal lath partitions are used.

Although one might consider that the great weight of the bed would make it difficult if not impossible for it to be resisted by the solid partition, yet careful study shows that most of the weight is carried by the floor socket, and the strain on the partition is very little indeed. In other words, the greatest leverage and the greatest stress is only encountered when the bed is in position for use, and when in use there is no weight on the partition. The details shown herein are those which have been prepared and found entirely successful by a large manufacturer of concealed beds.

This type of fixture is either hung from a special door or door jamb. The former type merely requires careful framing of the opening. The door jamb hung type of bed calls for the special jamb, Fig. 154, and reinforcement at this point. The ordinary 2 by 2 wood buck is used. It is attached to the adjacent stud by any of the methods mentioned. Next, reinforcing wires are wrapped about the buck and laced in and out through the lath, running back about a foot from the buck to the second stud away. Strap anchors are also used for this purpose. Anchors are installed at 2-foot intervals above the floor. The jamb is then secured to buck with nails or screws, and the hardware fitted as shown. The floor socket is fastened to the floor with wood screws or expansion bolts.

Section No. VIII Part "D"

Plasters

Proportioning Plaster Mixtures:

Sand. The character of plastering sand has much to do with the amount necessary with a given amount of gypsum, lime, cement, etc. The proportions indicated below must be considered merely as averages. Actual experience only will determine the proper proportions for other types.

Mixtures for Scratch and Brown Coats:

Note: The plaster coat used to back-up the scratch coat on the lath side of solid partitions should be proportioned same as for brown coat.

Lime Plaster, Scratch coat: 1 part composed 80% stiff lime putty to 20% Keene's Cement, to 3 parts dry plastering sand; 6 lbs. hair per cu. yd. of mortar. For brown coat: 1 part composed 90% stiff lime putty to 10% Keene's Cement, to 4 parts dry plastering sand; 3 lbs. hair per cu. yd. mortar.

Gypsum Plaster: For scratch coat[1], by volume, 1 part of gypsum to 1¼ of sand, for brown coat 1 part of gypsum to 2½ of sand; or, by weight; for scratch coat 100 lbs. gypsum to 200 lbs. sand, brown coat 100 lbs. gypsum to 300 lbs. sand.

Portland Cement Plaster. For scratch coat: 1 of portlant cement to 3 of sand: 'brown coat, same proportions. Use hydrated lime in amount 10% by weight of cement to make "fatter" and more easily worked mixture. (Same mixtures for exterior work).

Hair or Fibre for Gypsum and Portland Cement Plaster. For scratch coats use hair or fibre not to exceed 3 bushels per cu. yd. of sand, and for brown coats, where a finish coat is to be used, fibre may be added in amounts not to exceed 1½ bushels per cu. yd. of sand.

Keene's Cement Plaster, For scratch coat: 10 cu. ft., stiff, aged lime putty; 200 lbs. Keene's Cement; 1 lb. hair or fibre, 1 cu. yd. sand. For brown coat 7 cu. ft., stiff, aged lime putty; 150 lbs. Keene's Cement; 1 cu. yd. clean sharp sand.

Finish Coats for all Base Coats (Interior Use):

For the usual white smooth finish, lime putty and gypsum are mixed in proportions left largely to the discretion of the plasterer who must gauge the time of set by the area to be covered and by the weather. However, the usual proportions are 4 sacks (200 lbs.) of finishing hydrated lime to 50 lbs. of plaster of paris gauging.

Quantities:

(100 Sq. Yds. Finished Surface on Both Sides).

Two-Inch Solid Partitions:

Plastering Materials (Gypsum Plaster, smooth white finish) 4.0 cu. yds. (9000 lbs.) plastering sand; 4500 lbs. gypsum plaster; 800 lbs. finishing lime; 300 lbs. gauging plaster.

Lathing Materials. 110 yds. metal lath; channels, (assuming floor and ceiling runners) studs 12 in. spacing, 1100 lin. ft.; 16 in. spacing, 870 lin. ft.; 19 in. spacing, 760 lin. ft. Without floor and ceiling runners, but allowing 8 inches for each stud splice, channel quantities are 1000, 750 and 630 lin. ft. for 12, 16 and 19-inch spacings, respectively. Tie wire required is 15, 11¼ and 9½ lbs. respectively for these spacings.

Hollow and Double Partitions:

Require one more coat and about 10 per cent more plastering material than 2-inch solid partitions. Lathing materials are just double those given above for solid partitions except for single stud partitions.

Application of Plaster:

Solid partitions should be braced on channel side once in every 6 ft. of their height. Hollow partitions are self braced, while in double metal lath partitions, which have no cross ties between the faces, temporary braces should be provided on each face.

Solid Partitions:

Experienced plasterers find it more economical to make this a 5-coat job, but occasionally 6 coats are used. As these partitions are plastered solidly and two inches required in any case, nothing is gained by putting on a light scratch coat.

The scratch coat should cover the face of the lath about one-quarter inch. Before it has hardened it should be well scratched to a depth of about ⅛-inch.

When it has hardened sufficiently (usually in 24 hours) it is ready for the backing-up coat. Under no circumstances should the backing-up coat be applied until the scratch coat has hardened, since pressure of the trowel may break the keys of the unset scratch coat. The backing-up coat is usually applied in two operations, the second following immediately after the first plaster has stiffened. This brings the plaster out beyond the face of the channels where it is rodded and darbied, being actually the brown or straightening coat on this side of the partition.

---

[1] Contractors vary widely in proportions used for gypsum plasters on metal lath. For scratch coat the range is from 1 to 2 parts of sand to 1 of gypsum; for the brown coat the range is from 2 to 3 parts of sand to 1 of gypsum.

The brown coat on the lath side follows after the backing coat has set and then in turn come the finishing coats or other decorative finishes on each side.

Notes on Plastering:

For Sound Insulation. The portion of partition between baseboard grounds and the floor should be fully plastered. For additional sound insulation the metal lath partition should be carried to and plastered up to the underside of the ceiling slab.

What Plaster to Use:

For average interior use: Any of the plasters heretofore mentioned may be used on metal lath partitions with assurance of long life and freedom from cracking. However, since moisture will, in time, deteriorate gypsum plaster and this in turn affects the metal lath, this type of plaster, although satisfactory for other positions, should not be used for places which are continuously wet or damp. Portland cement, lime plaster or Keene's Cement Plaster which are inhibitors of corrosion should be used, particularly in bathroom, toilet and washrooms.

Plasters for Other Parts of Buildings:

For basement partitions and shower stalls[1], cold storage rooms, laundries, etc.: portland cement either straight or gauged with lime.

For chemical laboratories[1], X-Ray film storage, exposed factory partitions, for belt and shaftway enclosures in factories: Portland Cement.

For spandrel walls of factories, exteriors of tourist camps, filling stations, fences, etc.: Portland Cement plaster or prepared Portland Cement stuccoes. Under no circumstance should stuccoes made on magnesite (magnesium-oxychloride) base, be used.

For resistance to explosion or impact: Portland Cement plaster.

For 1-hour fire rating: On 2-inch solid partitions: Gypsum plaster, for hollow or double partitions of metal lath on wood or metal studs use gypsum or Portland Cement plaster.

For 2-hour rating (Solid Partitions): Unsanded gypsum plaster.

For Sound insulation all plasters are about equally good.

For X-Ray Treatment rooms use barium plaster.

---

[1] When exposed to severe service conditions, a further treatment of the plastered surface with waterproofing paints or by chemical fillers may be necessary.

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